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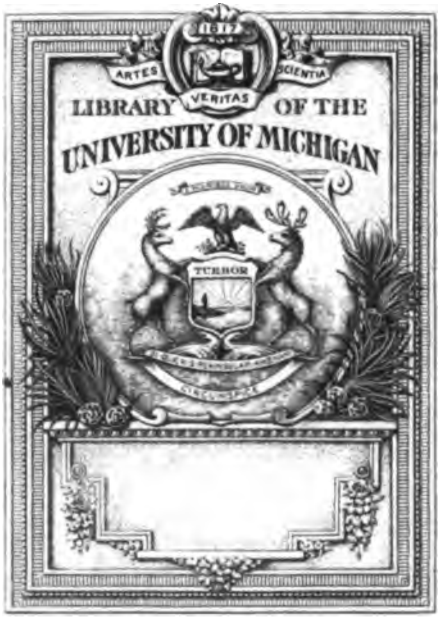

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PUBLIC OFFICERS AND INSTITUTIONS

FOR THE YEAR

1876.

WITHDRAWN

PUBLISHED BY THE SECRETARY OF THE COMMONWEALTH,
UNDER AUTHORITY OF CHAPTER IV. OF THE GENERAL STATUTES.

Vol. V.—Nos. 30 to 32.

BOSTON:
ALBERT J. WRIGHT, STATE PRINTER,
79 MILK STREET (CORNER OF FEDERAL).
1877.

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EIGHTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MASSACHUSETTS.

JANUARY, 1877.

BOSTON:
ALBERT J. WRIGHT, STATE PRINTER,
79 MILK STREET (CORNER OF FEDERAL).
1877.

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Commonwealth of Massachusetts.

STATE BOARD OF HEALTH, STATE HOUSE,
January 24, 1877.

Hon. J. B. D. COGSWELL, *President of the Senate of Massachusetts.*

SIR :—I have the honor to present to the Legislature the Eighth Annual Report of the State Board of Health, including the Special Report on the Pollution of Streams, Disposal of Sewage, etc.

Very respectfully,
Your obedient servant,

CHARLES F. FOLSOM, M. D.,
Secretary of the State Board of Health.

GENERAL REPORT OF THE BOARD.

STATE BOARD OF HEALTH, STATE HOUSE,
January 20, 1877.

To the Honorable the Senate and the House of Representatives of Massachusetts.

The State Board of Health herewith present their Eighth Annual Report:—

THE LAW CONCERNING SLAUGHTER-HOUSES AND NOXIOUS AND OFFENSIVE TRADES.

At their own request, and by the provisions of the following Act, chapter 144 of the Acts of the General Court of Massachusetts, 1876, the Board have been relieved of all farther care of the abattoir at Brighton, and they take pleasure in testifying to the satisfactory condition of that establishment:—

AN ACT to amend an Act to incorporate the Butchers' Slaughtering and Melting Association, in Brighton.

Be it enacted, etc., as follows:

SECTION. 1. Section six of chapter three hundred and sixty-five of the acts of the year eighteen hundred and seventy, is hereby repealed; and sections two and four of said act are hereby amended, by striking out the words "state board of health" where they occur in said sections, and substituting in place thereof, "board of health of the city of Boston."

SECT. 2. From and after the first day of June, eighteen hundred and seventy-six, the business of slaughtering shall not be conducted within the limits of the city of Boston, except upon the premises of the Butchers' Slaughtering and Melting Association, in said city.

SECT. 3. The said association shall, within a reasonable time, slaughter all cattle, sheep and calves which may be brought to their premises for that purpose by persons not occupying tenements therein, whenever the accommodations under their control on said premises will permit. They shall also prepare the meat and other products of such animals for the market. They may charge, in addition to the offal from said animals, such price per head as may be mutually agreed upon; and, in case of disagreement as to price, the same shall be fixed by the board of health of the city of Boston.

SECT. 4. Said board of health of the city of Boston is hereby authorized to appoint one or more inspectors to see that the rules and regulations for the conduct of the business of the association for the time being are fully obeyed by said association and their tenants, and also to see that none but healthy animals are slaughtered; the salary or salaries of said inspector or inspectors to be established by the city council of said city of Boston. The said inspector or inspectors shall at all times have access to the premises of said association and any building thereon, and also to the premises, yards or cars of any railroad company within the city of Boston for the purposes of examination, inspection and seizure of any meat or animals unfit for human food.

SECT. 5. Said board of health of the city of Boston is hereby authorized to make whatever regulations may seem to them fit in order to prevent the slaughter and sale of animals unfit for human food.—*Approved April 17, 1876.*

In the Miller's River District, within two miles of the state house, but not in the city of Boston, are several establishments for rendering putrid grease without the proper appliances for avoiding offence. It is believed that this business cannot be carried on in populous places, under the most favorable circumstances, without creating some offence; and that even in rendering fresh material, an excessive amount of care must be used in order that a nuisance may not result. It is the opinion of the Board, that the air of the metropolitan district of Boston is considerably and needlessly contaminated at the present time from such sources. So far as the Board can learn, however, the management of the *best-arranged* works in this region have failed to give rise to serious complaint during the year.

We therefore respectfully repeat our recommendation of last year, that there be some provision made by law for the inspection and regulation of such works hereafter.

Four formal petitions have been presented to the Board, during the past year, under the law concerning slaughter-houses and noxious and offensive trades.

In the case of *The Selectmen of Watertown* v. *George A. Sawyer*, it was shown at a public hearing that the defendant's premises were offensive, so situated as to be a public nuisance, and, in his opinion, incapable of being so improved as to satisfy the Board. On the fourth day of April, 1876, it was therefore *ordered*, after a public hearing and a personal inspection by members of the Board, that Mr. George A. Sawyer of Watertown be required to cease and desist from the business of slaughtering and rendering on the premises occupied by him on Arsenal Street, Watertown, on and after May 15, 1876, and that the Secretary of the Board issue the proper notices.

In the case of *Thirty-Four Petitioners* v. *Michael Carr of Tewksbury*, it was shown that the premises of the defendant were very offensive, close to the public road, near several residences, and incapable of proper management so as to avoid offence. After a public hearing and personal inspection by the Secretary of the Board, it was *ordered*, April 22, 1876, that Michael Carr be required to cease and desist from the business of rendering and soap-boiling on and after June 1, 1876.

May 29, 1876, a statement was presented to the Board from Robert A. Harmon and twenty-six others, with letters from two physicians engaged in active practice, maintaining that the establishment of Messrs. Randall & Ricker, in Reading, was still offensive and injurious to health. In this case, the Board had ordered, November 11, 1874, that the defendants be required to cease and desist from the business of boiling bones and meat; but they reserved their opinion for the time being with regard to the business of trying out fat, both of which processes were complained of in the original petition. Another hearing was held June 3, to give the defendants opportunity to be heard, although that was not considered to be absolutely necessary under the provisions of the law; and the premises were visited by the Secretary of the Board. The complaints of the petitioners were adjudged by the Board to be justified, and the defendants were accordingly ordered "to cease and desist" on and after June 19, 1876.

A petition was presented to the Board, July 21, 1876, from O. Keith and others of Bridgewater, complaining that the rendering establishment of Messrs. Lawton, Andrews & Brown of that town was very offensive and injurious to health. A hearing was held at the state house, July 28, and the premises were afterwards visited by four members of the Board. On January 20, 1877, in order to give the parties time to effect an amicable adjustment of the case, the Board still deferred judgment.

In a still more important case in Lowell, in which a formal petition was sent to the Board, a settlement was made without any formal hearing, and without any order of the Board.

In a number of cases, in regard to which the Board have no authority under the laws, advice and assistance have been given to the selectmen of towns and to others.

THE POLLUTION OF STREAMS, DISPOSAL OF SEWAGE, ETC.

In accordance with section two, chapter 28, of the Resolves of the General Court, 1876,* the Board have the honor to report that they have made a survey of the Nashua River Basin, where they have found that there are only two places within our State, where the pollution of the river is so great as to demand present attention and action, and to be apparently beyond the powers of the local authorities; namely, in Clinton and in Fitchburg, although there are evils on a smaller scale in Leominster and Shirley which should be remedied.

In Fitchburg, the greatest pollution is in a part of the city so sparsely settled that there is not evidence of serious complaint or injury arising therefrom, although the water in West Fitchburg is very foul, and unfit for some manufacturing purposes. In Fitchburg itself, the Nashua is unsightly, if not positively offensive. The introduction of sewers will increase the evil; and "Punch Brook," which drains a part of the city, is already so foul as to require some remedy.

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* "That the State Board of Health be instructed to report to the Legislature, for its use, such additional facts and information in regard to the above subjects of drainage and sewerage as may be in its possession, such report to be made in print not later than the first day of January, in the year of our Lord eighteen hundred and seventy-seven."

In Clinton, the drainage of the gas works and carpet company, and of part of the town, collects in a mill pond formed by the dam of a yarn company below. This is a serious source of offence to a large part of the inhabitants of the town, and must be the source of some deterioration of health, of which, however, we have no positive proof. In this town, as in Fall River, Haverhill, Lynn, Natick, Salem, Woburn, Worcester, and in the cities and towns comprising the metropolitan district of Boston, there are evils so great as in the opinion of the Board to demand speedy removal.

But they would not advise the establishment of any arbitrary standard for all places. Each evil must be judged on its own merits, and no injunction should be enforced without at the same time suggesting a remedy.

It is the opinion of the Board that any serious evils now to be found in our State from the pollution of streams, either by towns or manufactories, may be remedied at a reasonable cost —Boston and the adjacent cities and towns forming the metropolitan district, and possibly Lynn, Salem, and Worcester, only requiring a great outlay.

For Cambridge, Somerville, and adjacent towns, we would respectfully suggest the propriety of the passage of an Act of Legislature requiring an intercepting sewer to be built, the cost being assessed on the cities and towns deriving benefit from it; and, in consideration of the difficulty in finding a suitable outlet, it would be proper to attempt sewage-irrigation, if the results got from this method of disposal of sewage at the new prisons in Concord and Sherborn, at the new asylum in Worcester, and in the town of Lenox, be favorable.

We would quote from our Seventh Report as follows, and we desire to say that the appointment of a state engineer is considered by us of the highest importance:—

"It is the opinion of the Board that the water-courses in this State can be saved from serious pollution best by placing in some central authority advisory power, upon whose recommendations legislative action should be based to meet each particular case.

"In this connection, we would respectfully suggest for the consideration of the Legislature, the appointment as state engineer of some gentleman of skill and experience, to be paid by the parties who consult him.

"There should be absolute prohibition in all cases against casting sewage or filth of any kind into any stream or pond used as a source of water-supply. Where such conditions now exist, the sewage or filth should be diverted to some other channel. For, until our knowledge has so far advanced as to enable us to recognize 'germs' of disease, and to destroy them effectually by some simple and easy process, even purified sewage must always be looked upon as a dangerous addition to drinking-water.

"The following are the recommendations which the Board respectfully offer in their summary:—

"1. That no city or town shall be allowed to discharge sewage into any water-course or pond without first purifying it according to the best process at present known, and which consists in irrigation; provided, that this regulation do not apply to the discharge from sewers already built, unless water-supplies be thereby polluted; and provided, also, that such intended discharge can be shown to be at such point or points that no nuisance will arise from it.

"2. That no sewage of any kind, whether purified or not, be allowed to enter any pond or stream used for domestic purposes.

"3. That each water-basin should be regarded by itself in the preparation of all plans of sewerage and water-supply.

"4. That accurate topographical surveys be always made of all towns before introducing water-supplies or sewers.

"5. That steps should be taken, by special legislation based upon investigations and recommendations of experts, to meet cases of serious annoyance arising from defective arrangements for the disposal of sewage.

"6. That irrigation be adopted, at first experimentally, in those places where some process of purification of sewage is necessary; and that cities be authorized by law to take such lands as may be necessary for that purpose.

"7. That every town or city of over four thousand inhabitants be required by law to appoint a board of health, the members of which shall not be allowed to hold any other offices in the government of their city or town.

"Finally: The Board feel, that, in the present state of our knowledge, sweeping laws for the general and immediate purification of all our streams would be hardly justifiable, and that they are not called for by the present condition of our rivers."

Section 1 of these recommendations we would so modify, that the last sentence will read, "and provided, also, that such intended discharge can be shown to be at such point or points, *or with such complete or partial purification* that no nuisance will arise from it."

When the last report was sent to the Legislature, the Board did not feel prepared to make any recommendations with regard to manufacturers; we therefore desire to add the following section:—

That no manufactories hereafter established for carrying on trades, from which there is any refuse matter, be allowed to discharge polluting substances into any stream or pond used as a source of domestic water-supply; that they be forbidden to discharge any solid substance (not including matters in suspension) into any streams or ponds of the Commonwealth, and that they be required to purify or cleanse, according to the best available means, all polluting substances discharged by them into streams or ponds;—provided *they are not able to satisfy a proper authority that any such solid or polluting substances will work no practical harm to the public.*

In connection with this Report, the Secretary has prepared a statement of the advance in knowledge and experience on this subject during the year, in this country and in Europe; and a valuable paper is contributed by E. S. Chesbrough, C. E., on sewers and sewerage.

The experience of other countries has not thus far shown that sewage can be disposed of on a large scale either by irrigation, precipitation, or dry removal, in such a way as to be satisfactory from a sanitary point of view, and at the same time be profitable.

Complete and speedy removal, or thorough disinfection by sufficient quantities of earth or by other means, are, however, essential to health. To attain this purpose, in the opinion of the Board, no method at present known is so satisfactory as abundant and pure water-supplies, with well-devised and skilfully constructed sewers, carrying the sewage to a safe distance. Of course, this is not always practicable.

In the equally important matter of the proper construction of internal and external house arrangements, the Board cannot do better than recommend to local authorities the rules which have been carried out successfully for several years at Frankfort-on-the-Main, described on a later page of this Report.

Personal hygiene must, it is true, supplement laws protecting the public health; but without such laws, in many cases, no care on the part of individuals can save them from fatal diseases. Very few States, unfortunately, if indeed any, fully recognize their responsibility in this matter, and we are still very far from knowing all the causes of even all the "preventable" diseases, although we have become familiar with some few of them and with many of the circumstances without which others do not often occur. We do know enough, however, to justify us in repeating the prediction of one of the most distinguished men our country has produced, Dr. Benjamin Rush, who said at the beginning of our history as a nation that *the means of preventing pestilential fevers "are as much under the power of human reason and industry as preventing the evils of lightning and common fire. I am so satisfied of the truth of this opinion, that I look for a time when our courts of law shall punish cities and villages for permitting any of the sources of billious and malignant fevers to exist within their jurisdiction."*

OTHER INVESTIGATIONS DURING THE YEAR.

It was found, at a late day, that four of the papers intended for publication would require to be deferred, in order to allow more time for their completion. This is the only apology which the Secretary has to offer for occupying so large a portion of the report.

The following special papers, prepared during the year, are respectfully submitted to the Legislature for their consideration:—

SEWERAGE:—ITS ADVANTAGES AND DISADVANTAGES, CONSTRUCTION AND MAINTENANCE.

By E. S. Chesbrough, C. E., City Engineer of Chicago.

The importance of sanitary engineering has been only recently recognized in this country, and it is just beginning to command the attention which it deserves. The Board have been able to place before the community a paper on the above subject, by one of the first and most experienced sanitary engineers, and they hope that its practical suggestions and forcible reasoning will receive that attention to which they are entitled. The connection between good sewerage and good health, although often exaggerated, is shown to be direct and immediate, and to be one of the many ways in which satisfactory sanitation is to be got in populous places. At the same time, the writer wisely cautions the public from expecting too much from a single measure, where the causes of ill health are so manifold and so complex as must always be the case in all large cities.

THE SANITARY CONDITION OF LYNN.

By J. G. Pinkham, M. D., Correspondent of the Board for the city of Lynn.

The Board take pleasure in presenting to the Legislature the sanitary survey of Lynn. They hope that much good will result therefrom, not only to Lynn, but to all other cities in the State. Such a survey ought to be made of every town in the Commonwealth. If it were done, and efficient and wise action taken thereupon, an immense amount of preventable disease might be avoided.

To the inhabitants of Lynn, this report ought to speak in terms not to be misunderstood. The Board hope that Dr. Pinkham's remarks on the necessity of having an independent board of health, will be listened to and a plan adopted forthwith. Such a board should be wholly removed from the domain of politics, have ample power, and hold office for several years.

The Board would urge this as a general recommendation to the Legislature and to the cities and towns of the State.

Registration of Deaths and of Diseases.

By Charles F. Folsom, M. D., Secretary of the Board.

In 1842, the registration of vital statistics was commenced in Massachusetts, and, ever since, the registration reports have been edited by able and excellent men upon the returns sent in from the various cities and towns of the Commonwealth. The Board sincerely regret to find that the imperfect manner in which the vast majority of these returns have been made,—as they will continue to be made unless some more stringent laws can produce a radical change,—seriously impairs their value.

The Legislature have only to read the returns from our correspondents, and from the clerks of the cities and towns in the State, to feel convinced of the truth of this assertion. It seems evident that physicians, clerks of towns, undertakers, and sextons, should be compelled, under sufficient penalties, to do their respective duties. The community itself should also decide that, under no circumstances, should any body be buried until after proper legal formalities.

Finally, the registration should be put under the direction of experts who would have an interest in the matter, and one of whose duties it should be to see that, as far as possible, the registration-laws are obeyed.

In the important matter of the registration of diseases, much useful information is brought to the attention of the Legislature and of local authorities. It undoubtedly underlies one of the most fundamental principles of prevention of disease, and has already been adopted to some extent in some of the cities of Europe, in Brooklyn, N. Y., and in Pittsburg, Penn.,—nowhere, however, so efficiently and with such good results as in Holland. It is to be hoped that measures may be taken to render it possible here.

The Growth of Children.

By Henry P. Bowditch, M. D., Professor of Physiology in Harvard University.

This article embodies the results of measurements of the height and weight of about 24,500 school children of the city of Boston. The observations are in part distributed according to the nationality of the parents, and conclusions are drawn as to the comparative rates of growth of the two sexes and of children of different races. It is hoped that this investigation may be the means of calling the attention of those having charge of children to the importance of collecting vital statistics of this sort. Physical education is now recognized as of not less importance than mental training in all our public schools, but no means have been provided for ascertaining how far the training of the body is successful in improving the physique. Annual examinations determine with tolerable accuracy the progress made in mental acquirements, and there seems to be no good reason why the methods of training the body should not be subjected to similar tests. Periodical physical measurements stand in the same relation to bodily training as stated examinations stand to mental education; and, if the latter are considered essential portions of a plan of instruction, there is no reason why the former should not be regarded as of equal importance.

It seems desirable, also, that the fact, distinctly brought out in this investigation, that the rate of growth varies greatly at different periods of the school-life, should be recognized in the allotment of the studies of the school-course; for it is manifestly unwise to demand the maximum of mental effort at a period when the vital energies are most in demand for the growth and development of the physique.

Disease of the Mind.

By Charles F. Folsom, M. D., Secretary of the Board.

The Board believe that this paper will present many points of interest to all those who hope for amelioration, constant and progressive, in the treatment of the insane. The writer shows, by citing well-known historical facts, that during the past century very great strides have been made in the treatment of mental disease. The foreign correspondence, and the opinions of a few of our American superintendents, are especially valuable in this respect. They seem to prove that the more we can treat the insane as persons possessed of a certain amount of reason, and that the more we can arrange our asylums so as to resemble private homes and residences, the greater will be our success in restoring to perfect health this unfortunate class of our fellow-citizens, and the more complete our satisfaction in making their lives as happy as possible.

As regards supervision of the insane, the writer agrees with the late Dr. Samuel G. Howe, that "All human institutions are of course liable to abuse; but our Massachusetts hospitals for lunatics are as well guarded against them as any public establishments with which I am familiar." At the same time, there are many reasons why a more methodical inspection than now exists in our State would be likely to be productive of good.

If the plan suggested by Dr. Stearns, Medical Superintendent of the "Retreat" at Hartford, could be carried out—namely, that a competent commission in lunacy be appointed by the harmonious coöperation of the New England States, great good would be certain to come from it.

Our most serious need at the present time, so far as this subject is concerned, is considered to be thorough clinical instruction in mental disease in our medical schools. Thus far, there is no place in the United States, except New York, where this is done, and no medical school of importance in England, France, Germany, or Scotland where it is not done.

HEALTH OF TOWNS.

We desire to express our thanks to our correspondents in the different parts of the State for their hearty coöperation with the Board in securing information affecting the public health during the past year.

There are still very few local boards of health in the State independent of the regular town officers. The striking benefit which has followed their establishment in some of the towns in the State, and notably in Boston, is of itself marked evidence of their value.

In our correspondence under this head will be found useful and suggestive facts in regard to the predisposing causes of diphtheria, as it appeared during the past year. The investigations in Lowell, Lynn and Salem, in regard to circumstances attending its appearance, will be found especially valuable.

The epidemic of typhoid fever, described by our correspondent in South Dennis, is well worth careful attention.

We thank the registrars of the more populous places in the State for their politeness in furnishing us each week the statistics from which the schedules of mortality are published each Thursday morning in the "Boston Daily Journal." These are not as complete as they might be, and we cannot yet furnish a full and accurate statement of the weekly prevailing fatal diseases. If more general and extensive reports could be sent to us each week, as is entirely practicable with a slight modification in our laws on registration, the Board believe that great good would be got by the community at a very trifling cost.

As the metric system is likely to come into general use at no distant day, and as its simplicity readily commends itself to the public, a table of equivalent values is given, as was done last year.

The Board have expended nearly the whole of their appropriation for the year's work, of which about four hundred dollars were used for the Centennial Exhibition, and a little more than the same amount in the preparation of drawings, surveys, etc., for publication in the Seventh Report.

All of which is very respectfully submitted.

HENRY I. BOWDITCH,
ROBERT T. DAVIS,
RICHARD FROTHINGHAM,
DAVID L. WEBSTER,
JOHN C. HOADLEY,
THOMAS B. NEWHALL,
CHARLES F. FOLSOM,
Members of the State Board of Health.

THE METRIC SYSTEM.

LENGTH.

1 Myriameter	Mm	(10,000 m)	= 6.2137 miles.
1 Kilometer	Km	(1,000 m)	= 0.62137 mile.
1 Hectometer	Hm	(100 m)	= 328.0833 feet.
1 Decameter	Dm	(10 m)	= 393.7 inches.
1 Meter	m	(1 m)	= 39.37 inches.
1 Decimeter	dm	(0.1 m)	= 3.937 inches.
1 Centimeter	cm	(0.01 m)	= 0.3937 inch.
1 Millimeter	mm	(0.001 m)	= 0.03937 inch.

SURFACE.

1 Hectare	Ha	(10,000 sq. m)	= 2.471 acres.
1 Are	a	(100 sq. m)	= 119.6 square yards.
1 Centare	ca	(1 sq. m)	= 1,550 square inches.

CAPACITY.

1 Kiloliter or Stère	Kl or st.	(1000 l.)	= 1.308 cubic yards	= 264.17 gallons.
1 Hectoliter	Hl	(100 l.)	= 2 bushs. & 3.35 p'ks	= 26.417 "
1 Decaliter	Dl	(10 l.)	= 9.08 quarts	= 2.6417 "
1 Liter	l	(1 l.)	= 0.908 quart	= 1.0567 qts. (1.761 imperial pts.)
1 Deciliter	dl	(0.1 l.)	= 6.1022 cubic inches	= 0.845 gill.
1 Centiliter	cl	(0.01 l.)	= 0.61022 cubic inch	= 0.338 fluid ounce.
1 Milliliter	ml	(0.001 l.)	= 0.061 cubic inch	= 0.27 fluid drachm.

WEIGHT.

1 Millier or Tonneau	M or T	(1,000 Kg)	= 1 Kl or 1 Cu m	= 2204.6 lbs. (avoirdupois.)
1 Quintal	Q	(100 Kg)	= 1 Hl or 0.1 Cu m	= 220.46 "
1 Myriagram	Mg	(10 Kg)	= 1 Dl or 10 Cu dm	= 22.046 "
1 Kilogram	Kg	(1,000 g)	= 1 l or 1 Cu dm	= 2.2046 "
1 Hectogram	Hg	(100 g)	= 1 dl or 0.1 Cu dm	= 3.5274 ounces.
1 Decagram	Dg	(10 g)	= 1 cl or 10 Cu cm	= 0.3527 ounce.
1 Gram	g	(1 g)	= 1 ml or 1 Cu cm	= 15.432 grains.
1 Decigram	dg	(0.1 g)	= 0.1 ml or 0.1 Cu cm	= 1.5432 "
1 Centigram	cg	(0.01 g)	= 0.01 ml or 10 Cu mm	= 0.1543 grain.
1 Milligram	mg	(0.001 g)	= 0.001 ml or 1 Cu mm	= 0.0154 "

One kilogram is equal to a weight represented by one liter of distilled water at 4° C. In the centigrade scale 0 (32° + F.) is the freezing-point; 100° + (212° + F.) is the boiling-point. Five degrees C. correspond to nine degrees F.

All measures in the metric system are derived from the meter, and their names express their values. Some of the names in the French system (like our "dime") are not in practical use; *e. g.*, hectometer, decagram, etc.

One inch = 2.5 centimeters nearly; one quart (wine measure) = 0.946 liter; one pound troy = 0.373 kilogram; one acre = 0.4046 hectare.

EXPENSES OF THE BOARD.

Republishing "Filth Diseases,"	$140 00
Traveling Expenses,	144 01
Messenger,	50 30
Publishing Summary of Seven Years,	267 79
T. H. Hay, clerical services,	173 75
Express and freight,	190 68
Telegrams,	1 76
Investigations and clerical services on Infant Mortality,	363 50
Investigations and clerical labor on Consumption,	167 80
Surveys in Boston,	10 00
Examinations of ice-supply at Pittsfield,	44 50
Inspection of hospital in Illinois,	20 00
Drawings of Brighton Abattoir,	125 00
Carriage and horse hire,	21 00
Indexing Seventh Report,	32 50
Boston "Journal,"	29 24
Sheriffs, serving notices,	20 36
Examination of Nashua River,	585 10
Maps and drawings for reports,	227 20
Maps and surveys of Lynn,	180 00
Chemical analyses (Lynn),	38 75
Translation for Seventh Report,	30 00
Books and binding,	264 59
Postage and stationery,	241 20
Printing " "	134 45
Furniture,	44 06
Miscellaneous,	8 58
Special investigations and reports (H. P. Bowditch, E. G. Cutler, E. S. Chesbrough, A. H. Johnson, F. Nickerson, F. E. Oliver, J. G. Pinkham),	1,443 55
	$4,999 67

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THE POLLUTION OF STREAMS, DISPOSAL OF SEWAGE, ETC.;

BY THE SECRETARY OF THE BOARD.

WITH CHEMICAL EXAMINATIONS,

BY WM. RIPLEY NICHOLS,

Professor of General Chemistry in the Massachusetts Institute of Technology;

AND

WITH A MAP OF THE NASHUA RIVER BASIN,

BY EDWARD K. CLARK, C. E.

THE POLLUTION OF STREAMS.

> *"It has long been amongst the most fixed of the certainties which have relation to civilized life, that, wherever human population resides, the population cannot possibly be healthy, cannot possibly escape recurrent pestilential diseases, unless the inhabited area be made subject to such skilled arrangements as shall keep it habitually free from the excrements of the population."*—SIMON.

A single river-basin has been examined by the Board during the year, and that has been selected which offers the most topics for consideration, being situated in two States, being polluted at many points, and illustrating most of the important features that would be likely to govern legislation, if any should be thought advisable.

A brief *résumé* has also been prepared of the advance in this branch of knowledge during the year, including the strictly sanitary bearing of improper, inefficient, or incomplete methods of disposing of filth.

The proper construction of sewers has seemed of such vast importance to the Board, and one needing such general attention in all our cities and in many of our towns at the present time, that one of the most eminent and accomplished engineers has been engaged to prepare a paper on that subject.

That the water-carriage system, where it is practicable, is the only admissible method of disposing of the refuse of houses in large and highly civilized communities, there can be no doubt. The best substitutes for water-carriage, where any must be used, have been considered fully in the seventh report of the State Board of Health.

THE NASHUA RIVER BASIN.

A careful survey, based upon the county maps, and a personal exploration of the country itself, was made during the past summer by Mr. E. K. Clark, C. E., who also prepared the accompanying map.*

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* See page 70.

A circular was then sent to the medical correspondents of the Board, and to the chairmen of the selectmen of all the towns and the one city within the drainage-area of the Nashua River in our State, and later, to Nashua and to the three towns of New Hampshire which drain into the river, asking replies to the following questions:—

I. Is there any pollution of ponds or streams in your town arising from—
    (*a*) manufactories or mills;
    (*b*) town-sewage, etc.?
II. If so, what is—
    (*a*) the character of the pollution (lime, dyestuffs, excrement, street washings, etc.);
    (*b*) its extent (effect on color, smell, etc., of the stream, influence on fish, etc., whether offensive, unfit for cattle to drink, etc.)?
III. Does the offensive matter, if any, come from your own town, or from another?
IV. What is the source of your water-supply?
    (*b*) Is it free from contamination?
V. Are there *any complaints* from manufacturers, or others, of the pollution of streams in your town?
VI. Have you any suggestions to offer as to the drainage of the soil, or the sewerage of your town?

After returns had been received from all the towns in Massachusetts to which they had been sent, they were carefully compared with Mr. Clark's notes, and the places most requiring attention were visited by Professor Nichols and the Secretary of the Board. Later still, in September, and twice in October, a more extended survey was made by the Secretary; and, during the last four examinations, specimens of water were collected for chemical analysis.

From these several sources of information, chiefly, the following account has been prepared.

Area and Population.

The area drained by the Nashua River within the State is 457 square miles; in New Hampshire, 82 square miles. The country is not densely populated, there being about 48,000 persons, making an average of 106.5 to each square mile of the portion within Massachusetts; and there is not one large city. The occupation of the inhabitants is largely farming, although in several places manufacturing interests have sprung up, which have contributed almost wholly to any serious pollution of the streams which may exist.

The following table shows the distribution and movement of the population in the last twenty years. The total number of inhabitants in 1875 is somewhat larger than that given by Mr. Clark, as there are a few towns which do not lie wholly within the Nashua Basin, but have villages of some size outside of it. Such places as Gardner, Hubbardston, and others, which have only very small and sparsely populated portions in this drainage-area, are not given in the list.

Table I.—*Population of Towns in Nashua Basin in Massachusetts.*

TOWNS.	Sq. Miles within Drainage-area.	Whole Area of Towns in Sq. Miles.	Population in 1855.	Population in 1865.	Population in 1875.	Increase per cent. 1855 to 1865.*	Increase per cent. 1865 to 1875.*	Increase per cent. 1855 to 1875.*
Ashburnham, .	16.49	40.89	2,211	2,153	2,141	—	—	—
Ashby,† . .	22.01	26.59	1,176	1,080	962	—	—	—
Ayer,‡ . .	10.86	14.61	-	-	1,872			
Bolton, . .	9.59	21.40	1,255	1,502	987§	11.71	—	—
Boylston, . .	12.20	19.95	835	792	895	—	13.00	7.18
Clinton, . .	7.08	7.65	3,636	4,021	6,781	10.60	68.60	86.50
Dunstable, .	4.73	18.49	533	533	452	0	—	—
Fitchburg, .	30.33	30.33	6,442	8,118	12,289	26.00	51.40	90.76
Groton, . .	18.61	32.91	2,745	3,176	1,908	15.70	16.76‖	35.05‖
Harvard, . .	15.75	26.17	1,533	1,355	1,304	—	—	—
Holden, . .	33.07	36.52	2,114	1,846	2,180	—	18.09	3.02
Lancaster, .	27.77	27.77	1,728	1,752	1,957	1.38	11.70	13.30
Leominster, .	29.52	29.52	3,200	3,313	5,201	3.53	56.90	60.30
Lunenburg, .	28.26	28.26	1,224	1,167	1,153	—	—	—
Pepperell, .	23.25	23.25	1,765	1,709	1,924	—	12.58	9.00
Princeton, .	33.13	37.75	1,317	1,289	1,063	—	—	—
Shirley, . .	24.41	24.41	1,479	1,217	1,352	—	11.09	—
Sterling, . .	30.33	30.33	1,838	1,668	1,569	—	—	—
Townsend, .	37.35	37.35	2,092	2,056	2,196	—	6.81	4.97
West Boylston,	13.24	14.61	2,310	2,294	2,902	—	26.22	25.60
Westminster, .	28.71	37.91	1,979	1,639	1,712	—	4.45	—
	456.69	566.67	41,412	42,630	52,800	2.94	23.86	27.50

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* Where there is no change, or an actual decrease, the signs 0 and — are used.

† The towns in Roman letters are in Worcester County; those in *italics*, in Middlesex.

‡ Made a town in 1871, taking about 75 of its population from Shirley and the rest from Groton.

§ About one-third of Bolton was set off in forming the town of Hudson.

‖ Including 1,800 of the population of Ayer, which is about the number which would have belonged to Groton if the boundary lines of 1865 and 1855 had been kept.

It may be seen that there are only five places which have increased more than one-fifth since 1855. In Clinton and Fitchburg the manufactures which have been developed are of a kind to seriously pollute the streams. In Leominster, which owes its prosperity largely to comb factories, there is less refuse from the mills. Groton's increase in population (including Ayer) is due, partly at least, to its being a railroad centre, where trains meet from several important points. West Boylston, which has added only one-fourth to its numbers in a fifth of a century, does not yet discharge enough refuse into the streams to cause any complaints, so far as is known. The remaining towns, excepting a few villages in some of them, are chiefly engaged in farming, and have increased only slightly, or have actually diminished, in the last twenty years.

Water-Supply and Sewerage.

None of the towns have sewerage-systems, although a few sewers have been built in Fitchburg, Clinton and Leominster, chiefly for the removal of surface-drainage and the waste from some of the less polluting shops. Clinton and Fitchburg are about introducing sewerage-systems, or at least more sewers, and the same will probably be done at no distant day in Leominster. The trades, therefore, are the chief sources of pollution to the Nashua River, and they are such, more or less, pretty much throughout its entire length.

There are only two towns and one city containing over three thousand inhabitants; and they have got, or are about getting, abundant and satisfactory water-supplies without being dependent upon the river, except at its head-waters, where there is no pollution. The other towns rely upon springs or wells; and their water for domestic use is thought by our correspondents to be pure where not contaminated by such avoidable means as lead-pipe or improperly managed privies.

River-Statistics of the Nashua Basin.

The river-statistics of the Nashua Basin are now given as prepared by Mr. Edward K. Clark, C. E.

TABLE II.—*Statistics of Nashua River.*

NAME OF STREAM OR RIVER.	DESCRIPTION OF MILL.	Location.	No. of Hands Employed.	No. of Spindles.	Head and Fall in Feet.	Sets of Machinery.	Amount of Stock used per year, so far as known.	Appearance of water above mill.	Appearance of effluent.
Branch from Chaffinville,	Satinet Mill,	Holden,	28	-	32	2	182,000 lbs.	Good.	Good.
	Satinet Mill,	Holden,	6	-	7	1	26,000 lbs.	Good.	Good.
	Cotton Mill,	Holden,	30	2,300	26	-	124,800 lbs.	Good.	Good.
Asnybumsket River,	Cotton Mill,	Holden,	75	4,672	24	-	280,800 lbs.	Good.	Good.
	Woolen Mill,[1]	Holden,	70	-	10	3	234,000 lbs.	Good.	Discolored at times.
	Woolen Mill,[1]	Holden,	70	-	12	3	234,000 lbs.	Good.	
	Shoddy Mill,	Holden,	3	-	18	-	4,000 lbs.	Good.	Good.
	Woolen Mill,[2]	Holden,	120	-	46	3	240,000 lbs.	Good.	Usually clean.
Quinepoxet Brook,	Cotton Mill,	Holden,	30	2,500	17	-	54,000 lbs.	Excellent.	Good.
	Woolen Mill,[3]	Holden,	50	-	27	4	120,000 lbs.	Good.	Colored at times.
	Shoddy Mill,	Holden,	3	-	12	-	- -	-	-

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[1] Use some logwood, vitriol, sal-soda, soda-ash and soap.

[2] Use 5,000 lbs. logwood, 400 lbs. vitriol, 200 lbs. alum, 200 lbs. soap, per month; also some oxalic acid.

[3] Use 2,000 lbs. logwood, 200 lbs. vitriol, 1,200 lbs. soda-ash, 600 lbs. soap, per month; and do some coloring.

TABLE II.—*Statistics of Nashua River*—Continued.

NAME OF STREAM OR RIVER.	DESCRIPTION OF MILL.	Location.	No. of Hands Employed.	No. of Spindles.	Head and Fall in Feet.	Sets of Machinery.	Amount of Stock used per year, so far as known.	Appearance of water above mill.	Appearance of effluent.
Quinepoxet Brook, . .	Cotton and Shoddy Mill,[1] .	West Boylston, .	10	1,000	12	–	21,600 lbs.	Good.	Clean.
	Cotton Mill, ...	West Boylston, .	60	3,800	24	–	216,000 lbs.	Good.	Good.
	Cotton Mill, ...	West Boylston, .	45	3,312	15	–	162,000 lbs.	Good.	Good.
Still River, . . .	Cotton Mill, ...	West Boylston, .	160	1,000	28	–	594,000 lbs.	Good.	Colored at times.
	Woolen Mill, ...	West Boylston, .	90	–	28	5	336,000 lbs.	Good.	Colored at times.
Nashua River, S. Branch,	Cotton Mill, ...	West Boylston, .	50	2,656	10	–	168,000 lbs.	Good.	Clean.
	Cotton Mill, ...	West Boylston, .	160	–	16	–	514,800 lbs.	Good.	Clean.
	Cotton Mill, ...	Boylston, . .	125	1,300	14	–	– –	Good.	Good.
	Cotton Mill,[2]	Clinton, . .	1,200	30,000	28	–	1,620,000 lbs.	Good.	Considerably discolored.
	Comb Manufactory, . .	Clinton, . .	150	–	6	–	– –	Impure.	Discolored.
	Yarn Factory, . . .	Lancaster, . .	25	2,000	8	–	156,000 lbs.	Good.	Good.
Stream forming Quilt Pond.	Carpet Company,[3] . . .	Clinton, . .	550	–	4	–	– –	Good.	Foul and offensive.
	Clinton Gas Works, . .	Clinton, . .	3	–	–	–	800 tons.	–	–
	Yarn Factory,[4] . . .	Clinton, . .	50	4,000	29	–	300,000 lbs.	Very bad.	Bad.

Wachusett Brook,	Paper Mill,[4]	Westminster,	-	-	40	-	- -	-	-
	Paper Mill,[5]	Westminster,	-	-	13	-	- -	-	-
Nashua River, N. Branch,	Paper Mill,[6]	Fitchburg,	33	-	21	-	- -	-	-
	Paper Mill,[7]	Fitchburg,	27	-	27	-	1,500,000 lbs.	Good.	Discolored.
	Mowing-Machine Knives,	Fitchburg,	50	-	21	-	1,300 tons.	Not pure.	Discolored.
	Paper Mill,[8]	Fitchburg,	28	-	16	-	- -	Not pure.	Unchanged.
	Mowing-Machine Manufac'y,	Fitchburg,	30	-	12	-	936 tons.	Not pure.	Much colored at times.
	Paper Mill,	Fitchburg,	36	-	15	-	- -	Dirty.	Unchanged.
	Flour Mill,	Fitchburg,	4	-	7	-	950 tons.	Impure.	Discolored.
	Wood-Pulp Mill,[9]	Fitchburg,	6	-	11	-	- -	Not clean.	Unchanged.
	Worsted Mill,[5]	Fitchburg,	-	-	11	-	- -	Impure.	Unchanged.
	Cotton Mill,	Fitchburg,	50	3,700	11	-	648,000 lbs.	Not good.	Unchanged.
	Woolen Mill,[10]	Fitchburg,	70	-	10	4	170,000 lbs.	Not very good.	Colored at times.
	Fitchburg Gas Works,	Fitchburg,	3	-	-	-	740 tons.	Not very clean.	Unchanged.
	Machine Company,	Fitchburg,	200	-	12	-	- -	Not very clean.	Unchanged.

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[1] Shoddy mill picks eight tons stock per month.

[2] Use 10 bbls. lime, one ton chloride of lime, per month; vitriol, sal-soda; and do considerable coloring.

[3] Use about 5,000 lbs. of soap per month; do a large amount of scouring and coloring.

[4] Use 8,400 lbs. chloride of lime, 500 lbs. soda-ash, 216 lbs. vitriol, per month.

[5] Not in operation.

[6] Use 8 casks chloride of lime, 12,000 lbs. soda-ash, 4 tons alum, per month.

[7] Use 7,200 lbs. chloride of lime, 4,000 lbs. alum, 400 lbs. bluing, per month.

[8] Use 3,200 lbs. chloride of lime per month.

[9] Use no chemicals.

[10] Use 3,000 lbs. logwood, 3,000 lbs. fustic, 300 lbs. indigo, 700 lbs. soda-ash, 6½ bbls. soap, per month.

TABLE II.—*Statistics of Nashua River*—Continued.

NAME OF STREAM OR RIVER.	DESCRIPTION OF MILL.	Location.	No. of Hands Employed.	No. of Spindles.	Head and Fall, in Feet.	Sets of Machinery.	Amount of Stock used per year, so far as known.	Appearance of water above mill.	Appearance of effluent.
Nashua River, N. Branch,	Flour Mill, ...	Fitchburg, . .	10	-	10	-	- -	Not clean.	Unchanged.
	Machine Shop, . . .	Fitchburg, . .	60	-	11	-	- -	Not clean.	Unchanged.
	Paper Mill,[1]	Fitchburg, . .	39	-	18	-	1,040 tons.	Not very clean.	Discolored.
	Cotton Mill,[2]	Fitchburg, . .	-	-	16	-	- -	-	-
	Cotton-Duck Mill, . . .	Fitchburg, . .	100	5,000	18	-	561,600 lbs.	Fair.	Unchanged.
	Scythe Shop,[2]	Fitchburg, . .	-	-	12	-	- -	-	-
	Paper Mill,[3]	N. Leominster, .	30	-	8	-	150,000 lbs.	Not clean.	Colored.
	Tannery,[4]	N. Leominster, .	75	-	-	-	20,000 hides.	-	-
A small brook, . . .	Tannery, ...	N. Leominster, .	12	-	-	-	4,000 hides.	Clean.	Highly offensive.
	Leather-Board Manufactory,[5]	Leominster, .	32	-	10	-	650 tons.	Fair.	Colored red at times.
	Linen Mill,[6]	Leominster, .	22	732	10	-	104,000 lbs.	Fair.	Colored.
	Leather-Board Mill,[7] . .	Lancaster, . .	10	-	9	-	438,000 lbs.	Fair.	Colored red at times.
	Cotton Mill, ...	Lancaster, . .	60	2,376	15	-	163,800 lbs.	Good.	Unchanged.
Whitman's River, . .	Paper Mill, ...	Fitchburg, . .	25	-	24	-	900,000 lbs.	Good.	Somewhat colored.

	Paper Mill,[2]	Fitchburg, . .	–	–	25	–	– –	–	–
Phillips Brook, . .	Cotton Mill, ...	Ashburnham, .	44	1,600	22	–	187,200 lbs.	Very good.	Good.
	Chair Manufactory, . .	Ashburnham, .	30	–	12	–	– –	Good.	Good.
	Tub Manufactory, . . .	Ashburnham, .	15	–	6	–	– –	Good.	Good.
	Tannery and Morocco Goods,	Ashburnham, .	18	–	9	–	1,000 hides.	Good.	Somewhat colored.
	Chair Manufactory, . .	Ashburnham, .	200	–	20	–	– –	Good.	Good.
					35	–	70,200 lbs.	Good.	Good.
	Cotton Mill, ...	Ashburnham, .	20	1,300					
Nookagee Brook, . .	Woolen Mill,[8]	Fitchburg, . .	50	–	16	8	182,000 lbs.	Good.	Colored at times.
	Edge-Tool Company, . .	Fitchburg, . .	15	–	15	–	– –	Good.	Not changed.
	Paper Mill, ...	Fitchburg, . .	12	–	18	–	730 tons.	Fair.	Colored.
	Paper Mill,[9]	Fitchburg, . .	10	–	25	–	730 tons.	Impure.	Colored.
	Woolen Mill,[10] . . .	Fitchburg, . .	50	–	19	3	105,000 lbs.	Not good.	Dirty.
	Woolen Mill, ...	W. Fitchburg, .	60	–	18	2	104,000 lbs.	Bad.	Bad.
Monoosnoc Brook, . .	Comb Manufactory, . .	Leominster, .	10	–	15	–	– –	Good.	Good.
	Comb Manufactory, . .	Leominster, .	15	–	14	–	– –	–	–
	Comb Manufactory, . .	Leominster, .	25	–	15	–	– –	–	–

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[1] Use 12,800 lbs. soda-ash, 5,600 lbs. alum, 32 bbls. lime, per month.

[2] Not in operation.

[3] Use 9,000 lbs. chloride of lime per month.

[4] Do not use water-power; use spring-water for washing hides.

[5] Use Indian-red for coloring-matter.

[6] Use chloride of lime and soda-ash.

[7] Use 40 bbls. Venetian-red, 20 carboys sulphuric acid, 13 bbls. lime, per month.

[8] Use 1,600 lbs. logwood, 4,000 lbs. soda-ash, per month.

[9] Use a good deal of chloride of lime.

[10] Use 2,400 lbs. logwood, 1,800 lbs. soda-ash, per month.

TABLE II.—*Statistics of Nashua River*—Concluded.

NAME OF STREAM OR RIVER.	DESCRIPTION OF MILL.	Location.	No. of Hands Employed.	No. of Spindles.	Head and Fall, in Feet.	Sets of Machinery.	Amount of Stock used per year, so far as known.	Appearance of water above mill.	Appearance of effluent.
Monoosnoc Brook, . .	Comb Manufactory, . .	Leominster, .	10	-	15	-	- -	-	-
	Comb Manufactory, . .	Leominster, .	10	-	10	-	- -	Fair.	Fair.
	Woolen Mill,[1] . . .	Leominster, .	60	-	14	4	234,000 lbs.	Fair.	Colored at times.
	Comb Manufactory, . .	Leominster, .	20	-	4	-	- -	Dirty.	Unchanged.
	Comb Manufactory, . .	Leominster, .	25	-	3	-	- -	Bad.	Bad.
	Comb Manufactory,[2] . .	Leominster, .	65	-	12	-	- -	Fair.	Unchanged.
Nonacanicus Brook, . .	Paper Mill, ...	Harvard, . .	4	-	13	-	240 tons.	Good.	Colored at times.
	Tannery,[3]	Ayer, . . .	75	-	-	-	22,500 hides.	Good.	Bad.
Catecunamug Brook, .	Paper Mill,[4]	Shirley, . .	4	-	18	-	50 tons jute.	Good.	Discolored.
	Cotton Mill, ...	Shirley, . .	60	3,300	14	-	234,000 lbs.	Good.	Unchanged.
	Cotton Mill, ...	Shirley, . .	50	5,944	12	-	163,800 lbs.	Good.	Unchanged.
	Cotton Mill, ...	Shirley, . .	100	-	20	-	585,000 lbs.	Good.	Unchanged.
Bow Brook, ...	Leather-Board Mill,[5] . .	Shirley, . .	15	-	12	-	300 tons.	Good.	Very much colored.
Squannacook River, . .	Paper Mill, ...	Townsend, . .	8	-	13	-	180 tons.	Good.	Discolored at times.

	Paper Mill,[6]	Groton, . .	16	-	11	-	600 tons.	Good.	Discolored at times.
	Leather-Board Mill,[7] . .	Groton, . .	80	-	15	-	900 tons manilla.	Good.	Discolored at times.
Nashua River, ...	Paper Mill,[8]	Groton, . .	40	-	8	-	600 tons.	Good.	Discolored at times.
	Paper Mill,[9]	Groton, . .	65	-	11	-	1,560 tons rags.	Good.	Discolored.
	Paper Mill,[10]	Pepperell, . .	35	-	7	-	720 tons.	Good.	Discolored at times.
Nissitissett River, . . .	Paper Mill,[11]	Pepperell, . .	15	-	9	-	- -	Good.	-
	Leather-Board Mill, . .	Pepperell, . .	7	-	8	-	480 tons.	Good.	Discolored at times.
	Cotton-Batting Mill,[12] . .	Pepperell, . .	13	-	8	-	3,500 lbs.	Good.	Fair.

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[1] Use 400 lbs. logwood, 1,200 lbs. vitriol, 1,600 lbs. soda-ash, per month, and some soap.

[2] Use 1 bbl. lime per month.

[3] Do not use water-power.

[4] Use 6,000 lbs. chloride of lime, 500 lbs. alum, per month.

[5] Use 15 casks Venetian-red per month, and some leather scraps and canvas.

[6] Use 2 tons chloride of lime, 1,500 lbs. vitriol, per month.

[7] Use Venetian-red for coloring.

[8] Use 2 tons chloride of lime, 30 casks lime, half-ton vitriol, per month.

[9] Use 3 tons chloride of lime, 750 lbs. vitriol, 750 lbs. alum, per month.

[10] Use 1½ tons chloride of lime per month, some lime and alum, also some coloring-matter.

[11] Not in operation.

[12] Do some coloring.

The mills, generally speaking, discharge their refuse, including in many cases the house-offal from the tenements of the operatives, directly or indirectly into the streams. In a few cases, however, cesspools are used and their contents applied to the land. For the most part, the total refuse is small when compared with the volume of the stream, or it is cast in only at intervals, so that, judged by the eye, there is not a serious amount of pollution in many places. The appearances of the stream above and below each mill at the time of Mr. Clark's visits are given in the last two columns of the table.

Under the head of Remarks are given approximate statements of the chemicals, etc., used in the various processes. This is not assumed to be entirely accurate or complete, but will give a fair idea of the amount of the coarser refuse which finds its way into our rivers.

In some places the manufacturers complain of the foul condition of the water when it reaches them. Where it is used only for power, or for washing horn, it is not necessary that it should be pure. Occasionally spring-water is used for boilers, as the water of the river is too much polluted for that purpose. In Fitchburg, at one of the paper mills, the water is filtered before it can be used; at one of the woolen mills it is fit for dyeing dark but not light colors; at another woolen mill there is serious complaint of the condition of the water. Below the works of the carpet company in Clinton the water is so fouled by the gas works and by the scourings of wool, as to be a source of the greatest discomfort, if not of actual ill health, to the mill operatives below and to a large part of the town.

It will be seen, too, that foul or very offensive water, in the course of a few miles, loses its unsightly appearance altogether when not more concentrated than in the worst parts of the Nashua. Filthy, or at least turbid, pretty much through its whole course in Fitchburg, it is quite clear before reaching Leominster. The freshets of spring and autumn, too, scour out the river-bed so effectually as to prevent any serious accumulation of deposits from year to year; and, indeed, in some places, the great amount of earthy matter brought down in the stream at such times forbids the use of the water for manufacturing purposes.

At the time this examination was made, the river was rather high; so that the noticeable amount of pollution of the streams was much less than it would be in the latter part of summer. The mills, however, were in fuller operation than can be the case when the water is very low, although the depression in business had caused a few to run only a part of the time.

Saw mills are not included in the tables just given, although designated on the map. They employ very few men, and their only refuse—sawdust—is very easily, and should always, be kept out of the streams.

TABLE III.—*Summary of* STATISTICS OF NASHUA RIVER

[The letters F, D, etc., refer to the map at page 70.]

	F	D	G	E	C	c	B	b	A	AA.
Drainage-area above point indicated, in square miles, ...	57	134	57	131	343	81	448	65	510[1]	-
Drainage-area above where the Nashua joins the Merrimac, ...	-	-	-	-	-	-	-	-	-	539
Dry-weather flow at respective points in 24 hours, in cubic feet, ...	1,231,200	2,894,800	1,231,200	2,829,600	7,408,800	1,749,600	9,676,800	1,404,000	11,016,000	-
Dry-weather flow at respective points in U. S. gallons, ...	9,209,376	21,553,104	9,209,376	21,165,408	55,417,824	13,087,008	72,382,464	10,501,920	82,399,680	-
Number of polluting factories or mills, .	14	25	21	48	81	3	87	3	92	-
Number of polluting factories or mills per square mile, ...	0.25	0.18	0.37	0.37	0.24	0.05	0.20	0.25	0.20	-
Number of operatives in said mills,[2] .	600	3,163	687	1,776	5,303	54	5,408	35	5,443	-
Population above respective points, 1865,	2,750	10,600	4,700	16,000	33,750	4,200	38,800	900	39,700	-
Population above respective points, 1875,	3,000	14,100	5,600	22,200	43,200	3,800	47,800	1,000	48,800	-
Population above respective points per square mile, ...	53	105	98	169	126	58	111	83	109	-
Population of cities, villages, or mills now draining into river above said points, ...	1,800	8,500	3,000	8,000	20,000	500	25,000	400	26,500	-
Population of this character per square mile, ...	32	63	53	61	58	8	58	33	58	-

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[1] Including a small part of New Hampshire.

[2] These numbers include only the mills (86 in all) in operation at the time of the survey.

TABLE IV.—*Summary of Manufactories.*[*]

	No. of Mills.	No. of Hands Employed.
Woolen Mills,	14	1,265
Shoddy Mills,	2	6
Cotton Mills,	22	2,478
Paper Mills,	20	437
Edge-tool and Machine Works,	6	350
Comb Manufactories,	9	330
Tanneries,	4	180
Chair and Tub Manufactories,	3	245
Leather-Board Mills,	5	94
Flour Mills,	2	14
Gas Works,	2	6
Linen Mill,	1	22
Wood-Pulp Mill,	1	6
Cotton and Shoddy Mill,	1	10
Total,	92	5,443

[*] Including 3 paper mills, 1 cotton mill, 1 worsted mill, and 1 scythe manufactory not in operation.

Pollution from Mills.

The character of the pollution from the various trades was given fully in the last report, so that only a brief statement will be made with regard to them here.

Woolen Mills.—The chemicals used are reported this year to be chiefly soap, soda-ash, sal-soda, chloride of lime, alum, blue vitriol, sulphuric acid, oxalic acid, indigo, logwood, fustic, and a few other coloring matters. Urine and dung are not now so much used as formerly. The chief sources of pollution are:

1. The "wool suds," consisting of soap or alkali and water, with the grease, waxy substance, and dirt removed from the wool,—a highly offensive mixture, and constituting about nine-tenths of the waste. 2. The "waste liquor" from the dye-vats, a concentrated fluid containing alum and coloring matters, which discolors streams, but does much less harm—in fact, to some degree, neutralizes the evil done by the animal refuse. 3. The water used in washing the dyed goods, and containing dyestuffs in small quantities, with a little glue and soap—not a source of serious harm.

A comparative analysis of these three waste fluids is given, as follows, in the third report of the Second Rivers Pollution Commission of England; the results are expressed in parts per 100,000:—

TABLE V.—*Waste Fluids from English Woolen Mills.*

	DISSOLVED MATTERS.							SUSPENDED MATTERS.		
	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrates and Nitrites.	Total Combined Nitrogen.	Metallic Arsenic.	Mineral.	Organic.	Total.
Washing water from dyed and scoured goods, .	29.62	0.19	0.05	0.01	0.34	0.41	0.002	0.72	0.88	1.60
Waste liquid from woolen dye-vats, ...	107.60	48.97	3.32	0.49	0	3.73	-	24.08	77.92	102.00
Waste liquor from wool scouring and washing, .	1,099.40	132.48	9.88	54.61	0	54.85	trace.	870.95	2,611.65	3,482.60

Cotton Mills.—In washing, bleaching, printing, and dyeing calico, most of the materials used find their way into the streams, as only a small quantity, consisting of starch and coloring matter, remains in the cloth. The substances used are madder, garancine (prepared madder), peachwood, logwood, sumach, starch, gum, dung, sulphuric acid, muriatic acid, soda-ash, "bleaching powders," lime, soap, arsenate of soda, bichromate of potash, acetate of lead, and some other dyes peculiar to different houses, and kept more or less secret. From such coarse substances as madder and logwood, the amount of refuse is very great, but they are not now so much used as the coloring matters extracted from them. In bleaching, the amount of pollution to the streams is not great, and consists chiefly of alkaline and soapy liquors, with some of the salts of lime, mostly insoluble, and soon subsiding in the form of a heavy precipitate. If the cotton is scoured and washed before use, the soapy and alkaline refuse is considerable. Dyeing, printing, and scouring are not done in many of the mills included in this examination.

Paper Mills.—Soda-ash, lime, chloride of lime, alum, and sulphuric acid are used. The processes which pollute the streams are the cleansing, while dry, of the dirty rags of which some of the paper is made; boiling the vegetable fibre or rags into pulp with alkali at high pressure, forming a soapy refuse, which is offensive to smell, and one of the most polluting fluids which is passed into the streams; washing this substance; bleaching with soap and lime, and in some cases coloring largely by means of arsenical and aniline dyes. Where paper is used as the raw material, and no coloring is done, of course the amount of refuse is small; and of the expensive dyes very little is wasted at best.

Comb manufactories discharge into streams chiefly washings from horns or hoofs, containing a certain amount of animal matter. They are not represented as being serious evils.

Tanneries have a considerable amount of waste in lime, hen-manure, and animal matter (*i.e.*, the washings or scrapings from the hides), forming a highly offensive compound. The spent "bark-liquor" does very little harm. In fact, that and the iron salts "disinfect," in a considerable degree, the other refuse. The hair and "fleshings" are now universally saved.

Leather-Board Mills.—Lime and sulphuric acid are used in reducing the scraps of rope, canvas, leather, etc., to the suitable condition, and are finally wasted. In coloring, Venetian-red (one-third oxide of iron and two-thirds sulphate of lime) and Indian-red (nearly pure red oxide of iron) are employed, with a little alum. The streams are very much discolored near the mills when the refuse is discharged, but soon become nearly clear, as the matter is mostly insoluble, and readily settles.

Shoddy Mills.—There are two in Holden; and in West Boylston one cotton mill has a department for this work. They are not represented as casting any matters into the river from the processes of manufacture.

One linen mill (in Leominster) uses cotton yarn and flax tow for stock, cleansing and bleaching with chloride of lime and soda-ash.

Gas Works need not pollute streams at all. The tarry and ammoniacal refuse which they usually waste is offensive, mingles slowly with water, and is noticeable at a long distance from its point of discharge. It can be, and should be, saved.

Works for the manufacture of iron and wooden ware, and flour mills, of course, do not need consideration in this connection.

Saw Mills sometimes most needlessly fill up the river-beds with accumulations of sawdust.

There are no *chemical works* on the Nashua or its tributaries.

Survey of the Nashua Basin.

Mr. Clark's account of the basin of the Nashua River is as follows, dated June, 1876 :—

The southernmost branch of the Nashua River rises in the southern part of Holden, where there are two small woolen mills and a cotton mill. The stream receives but little pollution, as the mills do very little coloring or washing, and the village upon it has a small population. Asnybumsket Brook rises in quite high land, and flows through the more central part of Holden, a village of about 2,500 inhabitants, receiving, beside the refuse from the woolen mills and one or two tanneries at this point, the drainage from a few of the houses. The soil is sandy, and absorbs the surface-water readily. Quinepoxet Brook rises in the high land of Princeton, and upon it, at the village of Ruralville, are a small woolen and a cotton mill, employing, at both, about 80 hands. The water of these three streams, united to form the Quinepoxet River, has a rapid fall as it flows through the town of West Boylston.

Still River rises in the high and broken land of Princeton and Sterling, and receives only the surface-drainage from the very small villages of East Princeton and West Sterling, of which the soil is sandy. At Oakdale (population 1,000), in West Boylston, Still River joins Quinepoxet River, to form the south branch of the Nashua, and gives power to a cotton and woolen mill, employing about 250 hands. The water is very clear and light in color, but, at times, is discolored below the mills by the dyestuffs. The privies of the operatives discharge into the river.

After leaving the mills at Oakdale, the stream flows through West Boylston Centre (population about 3,000); it is used by the cotton mills at that place. The excrement, the only refuse from both mills, is allowed to go into the river. The sewage from the houses about the lower mill is carried directly to the land, and used upon it as a fertilizer. The village is very favorably situated to drain into the river, and the surface-drainage must be considerable; the soil is suitable for filtering such drainage.

In the town of Boylston, the river affords power to one cotton mill. In the next three or four miles, the fall is so gradual that the power is not used. At Clinton, the Lancaster Cotton Mills have a fall of 28′. Considerable bleaching and coloring is done at this mill; and the refuse from these processes, with the excrement from 1,200 operatives, goes into the stream, which is at times very much discolored as it leaves the mill; its usual appearance in summer is not that of clean river-water. Above the mills the water is clear, and is used by some families and by the operatives for domestic purposes. As a general thing, the houses about the mill are connected with cesspools, which are frequently cleaned.

About forty rods lower is a comb manufactory, employing about 150 hands. The only refuse from it is the water in which horns are washed, with some lime and excrement from the factory. The water, as it comes to the place, is noticed to be impure, but causes no inconvenience. Not far below this manufactory the river receives the water of a small stream, which is the outlet for two or three ponds south of Clinton. The dam of the Clinton Yarn Company, which is on this stream, about one mile from the Nashua River, causes a pond to be made in about the centre of the town, which is situated on surrounding hills, with advantages for draining into this basin. The Carpet Company are located above the pond, and have the first use of the water of the brook, which, in its natural state, is very pure; but, as it leaves the manufactory, where it is used for dyeing and for washing large quantities of wool, it is dark and impure. This pond, situated as it is in the middle of the town, and made the receptacle of all kinds of refuse, is the source of intense annoyance, if not the cause of more serious troubles, to persons living in the vicinity. At the yarn factory, the foul gases and effluvia render some of the rooms almost uninhabitable; and for manufacturing purposes, spring-water, of which there is an abundance near the mill, is necessarily used. These springs seem to be supplied from the stratum of water-bearing gravel, which underlies a portion of the town, and through which the water moves with such considerable velocity that, where cesspools are accidentally placed low enough to connect with it, they are kept constantly clean. Clinton has a population of 6,781, but no system of sewerage; there are, however, two or three sewers brought directly into the pond, into which the gas works also discharge a good deal of refuse. Water will probably be introduced from Sandy Pond. About two miles south of Clinton, the south and north branches of the Nashua unite.

The southerly tributary of the north branch is the outlet for Meeting-House and Wachusett ponds, supplies power to two paper mills at present not in operation, and, in its course, receives the surface-drainage of Westminster and Wachusett villages (population 400 and 150 respectively). The stream is joined by the waters of Whitman's Brook, which rises in the south-western part of Ashburnham. The fall of the latter is utilized by several saw mills and chair manufactories. Both of these streams rise in quite elevated country; along their courses the soil is sandy, and the hills are wholly granite. They supply power to several paper mills and machine-shops in the south-western part of Fitchburg; the pollution from the latter is but little, while from the former it is sufficient to color the water as it leaves the mills, and to render it unfit for use in boilers.

The stream which comes in from the north rises in Ashburnham, and its rapid fall affords power for several mills at Ashburnham Centre. The water is very clear, and, as it is comparatively large in volume, is not perceptibly changed as it flows through the village. Ashburnham Centre has a population of about 2,000; the land is sandy and quite steep in its inclination toward the stream. In Fitchburg, the water is used by three woolen mills and two paper mills, all situated only a few rods apart. The upper privilege, where the water is good, is used by a small woolen mill for scouring and dyeing, and at times the effluent is discolored. It is then taken by two paper mills manufacturing about four tons of stock per day; the woolen mills, still lower, complain of the condition of the water as it comes to them, and, as the volume of the stream is not large, the impurity is particularly noticeable during the summer months.

In passing through the city of Fitchburg, the Nashua River (north branch) is used by a large number of manufactories, all of which turn their refuse into it. The city has a population of about 12,000, and is supplied with water from Scott's Brook. No system of sewerage has been completed; there are, however, one or two brick and a few pipe sewers discharging into the river. A bad odor rises from the river at times, animals refuse to drink the water, and fish have almost entirely disappeared from this portion of it. The soil is largely composed of sand and gravel. The hills in the vicinity are high and almost wholly of granite.

At North Leominster, the water is used by a leather-board mill, manufacturing about 5,000 pounds of stock per day. Upon the high ground opposite this mill, there is a tannery employing 75 hands; and, a little higher up, another tannery, belonging to the same parties, is a source of very serious annoyance, as its refuse is discharged into a small brook, two feet or less wide, and running through the village of North Leominster; the surface-drainage is not here very great. About a mile lower, the river receives the water of Monoosnuc Brook, which flows through Leominster Centre (population about 3,000). The town is supplied with water collected in a reservoir at the head of Morse Brook, and the sewers already built discharge at a lower point into that stream just above one of the dams. The town sewage, with the refuse thrown into the water by the manufactories, will necessitate the completion of the sewerage system already proposed, and which provides for a sewer which shall intercept the smaller street sewers and have its final outfall below the town.

Two miles and a half below Leominster Centre is a linen mill where a large quantity of chloride of lime is used in bleaching; the refuse runs into the river and discolors it at times. A leather-board mill, about a mile below, manufactures 1,200 pounds of stock per day; the effluent is colored by the Venetian-red and lime used. At the cotton mill, a mile and half below this, the water is in appearance quite clean, and of light color.

From the point where the north and south branches of the Nashua unite, to the State line, the fall is very gradual; soil sandy.

Catecunamug Brook rises in the central part of Lunenburg. Its water is not available for power until it reaches Shirley, where it is used by a paper mill and three cotton mills. The refuse from the paper mill discolors the water a little; the excrement from the cotton mills and the houses about them is usually collected in boxes and removed once or twice a year. Upon Bow Brook, which flows into one of the ponds in the Catecunamug, there is a small leather-board mill by which the water is colored very dark red, as may be observed through the pond and to some distance below. The effluent lime, sulphuric acid and coloring matter are said to have killed the fish which were formerly found in the pond.

Nonacanicus Brook joins the river at Ayer, a town of about 1,800 inhabitants, with no system of sewerage, although a single sewer has been built, with which a cheese factory and a few houses are connected; it also receives the surface-water from the street. A tannery pollutes a pond in the outskirts of the town. In Harvard, upon this stream, there are one or two small mills.

Squanacook Brook rises among the granite hills of Ashby, and flows with a very gradual fall through the soil of Townsend and Groton. The drainage along the river is small, and the greatest amount of refuse is from two paper mills in Groton, by which the water is colored a little.

Nissitisset River rises in New Hampshire, and joins the Nashua in Pepperell. Near the point where the two unite are a cotton-batting and a leather-board mill. Some coloring is done at the former, and the effluent water of the latter is colored at times.

The waters of the Nashua River and its tributaries, with the exceptions mentioned, are, so far as appearance goes, in a good condition, clear and light in color.

Replies of Correspondents.

Our correspondents report as follows:—

Ashburnham.—The height of land between the Merrimac and Connecticut valleys lies in this town. Our ponds and streams arise from springs within our limits; and we have no large manufactories which produce offensive matters. The main business is the manufacture of chairs; a *small* amount of leather dressing is done, but there is no complaint of pollution of waters below. This village is comparatively thickly settled—ground hilly—and it would be an easy matter to construct sewers under the principal streets, and, connecting them with the stream, allow all waste liquid from whatever source to pass off through them.

Ashby.—There is no pollution of ponds or streams.

Ayer.—There is no pollution except of a pond on a brook flowing into Nashua River, and I have never known any complaint. I have not noticed any appreciable effect in the stream. Privies are universally used, and are not by any means properly taken care of. The soil is light, sandy, and porous, and generally well drained.

Bolton.—No pollution of streams. Night-soil is generally carted off once a year.

Boylston.—No complaint has ever been made of pollution of streams in Boylston.

Clinton.—All the water passing the dye, gas, and wool-washing house from the carpet company is contaminated, of dirty color and offensive smell, *sure death* to fish,* unfit for cattle to drink, and is collected in Quilt Pond.† I would suggest that the pond be drained and covered up for the health of the citizens. The Lancaster Mills are on a branch of the Nashua, and do not cause enough pollution to affect the fish one mile below.

Here is a pond of about two acres, directly in the heart of the town (population, 6,781), receiving the sewage of the gas works, and also the carpet company's sewage entire. The wool-wash is immense, and being largely of animal matter, the stench, when the pond is down, on a hot day, is *telling*. It is something that can be remedied by using a covered drain; and the owners of the pond can be bought for a fair sum. I will agree to get you names by the *thousands*, certifying that a nuisance is in their midst and should be abated.

Dunstable.—No manufactories in our town, except saw mills and a grist mill.

Fitchburg.—The water of the Nashua, in passing this city, is extensively polluted by the wash of nine paper mills, four woolen mills, two cotton mills, gas works, and other manufacturing establishments on or in the immediate vicinity of the stream. The water presents a dirty appearance, and people generally shrink from bathing in it. It receives the whole sewage of the city, so far as sewage is disposed of at all. The main sewer discharges into it at a point not far below the thickly settled portion of the city. Punch Brook is used for sewage purposes, and discharges into the Nashua about in the centre of our population. All the chemicals employed in paper mills and different manufacturing establishments—excrement, dyestuffs, etc., and street washings—find their way directly into the stream. The extent of the pollution is great. The color of the water is materially changed in its whole course through the city during low water. I have seen the water in a small canal below a woolen mill, of almost inky blackness, so as visibly to affect the main current some distance below in the main stream. The river is but little used by manufacturers, except as a motive power. I have heard complaints of the offensiveness of the water on account of sewage-contamination at the outlet of the sewer, and by those in Punch Brook. I know of no practicable way of getting rid of our sewage, except to discharge it into the Nashua River, and thus pollute the stream. That work has already been done by the manufactories. I think the outlet of our sewer should have been carried farther down stream.

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* Eels even are killed.

† Formed by the dam of the yarn company below.

Groton.—We have two paper mills and one leather-board mill in the town, employing in all 90 hands. The lime-bleaching material and excrement from the cotton mills, and alum and Venetian-red from the leather-board mill, go into the river. The color or smell of the water, a short distance below, is not affected. It is thought to have no material influence on fish. Cattle drink it readily.

Harvard.—No complaints; the town is naturally drained.

Lancaster.—In the leather-board mill, 500 barrels of Venetian-red, 250 carboys of sulphuric acid, and 160 barrels of lime are used annually, a combination which must be destructive to fish and injurious for all domestic purposes. The south branch of the Nashua has been made destructive to fish by the sewage, mills, and gas works of Clinton. It is, in my opinion, none too soon that this wholesale poisoning of our rivers and streams should be checked.

Leominster.—The drainage from a tannery at the north village is dark in color and highly offensive to smell, particularly in the evening and night. Many of the inhabitants have complained of the offensiveness of the small stream running down from the tannery through the village.

Lunenburg.—No trades-pollution. The surface of this town is somewhat hilly, with no large tracts of marshy grounds. Still, if that thorough drainage of our moist lands which our agricultural interest demands should be made, the general healthfulness of the citizens would thereby be promoted.

Pepperell.—The pollution here consists of all the filth arising from the manufacture of paper at four mills; but there are no complaints.

Princeton.—No pollution from trades or town sewage.

Shirley.—On the Catecunamug, there is a mill for the manufacture of "leather board," at which they use a red mineral coloring matter, which at times colors the whole stream.* I think it drives the fish from the stream. Lime is used also to some extent. The above will also apply to some extent to the Squanacook, another tributary of the Nashua, which forms a portion of the boundary line between this town and Groton. The water is at times wholly unfit for cattle to drink. In the case of the Catecunamug, the offensive matter is introduced into the stream in this town; but a portion of the lime and coloring matter in the Squanacook comes from Groton.

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* This is a mere brook, a couple of feet wide.

All the streams passing through this town empty into the Nashua River. On the south is a stream called "Bow Brook," having its source in Fort Pond in Lancaster; on this stream, in Shirley South Village, is a mill for the manufacture of leather board; at a short distance below, the stream unites with Catecunamug Brook, which has its source about five miles above, in Whaloam Pond in Lunenburg. On the latter stream is a mill, used till recently in the manufacture of paper; on the union of these two are three cotton mills and one saw mill,—distance to the Nashua River about two miles. The leather-board mill uses from two to three hundred pounds of red clay daily,—nothing else, I am informed by the agent. The material used in the manufacture of the board is mainly the waste from boot and shoe factories. The clay is the coloring matter, though I am told that about one-third of it is incorporated in the article manufactured. The articles used in cleansing and bleaching the rags, ropes, etc., of which the paper is made, are chloride of lime and soda-ash, say one hundred pounds daily. The cotton mills run 14,000 spindles, and employ some 300 persons when in full operation. To each mill is attached a water-closet for daily use; a large part of the sink-drains of those living near the streams empty into these streams, so that from all these substances there must be considerable impure matter emptying into the Nashua River from this little village. There is a stream arising in the north-westerly part of Lunenburg and passing through the northerly part of this town, called Mulplus Brook, on which there are several saw, grist, and lumber mills. On the north of the town is the Squanacook River, a tributary of the Nashua; on this is a leather-board mill of much greater capacity than the one first described; but, as this is partly in Groton, I will add nothing farther in regard to it. On the Mulplus in Lunenburg, as well as in Shirley, are several mills for the sawing of various kinds of lumber. For many years the waste—the sawdust—has been sent adrift in the stream, and the effect has been not only to much obstruct the flow of water in many places, but to nearly destroy the brook-trout, which were formerly abundant in it and in the tributary brooks. In a pond of about one hundred acres, situated below the paper mill on Catecunamug Brook, sportsmen say pickerel have grown scarce since the mill began to be used for such purposes. We do not know that the sawdust has killed the trout and the chloride of lime the pickerel, but the facts as stated exist.

Sterling.—No trades-pollution; a small stream and a low, flat meadow receive all the sewage that goes from the central village; and it remains in the ditches of this meadow, there not being any proper outlet. The meadow is in close proximity to the village.

Townsend.—There is no trades-pollution, unless, possibly, from decaying sawdust, of which there are large quantities in our river. I have often noticed that, in the vicinity of the largest sawdust beds, the water has a darker look. As the water is so variable as to height, there must be a decay going on in the warm season. I never knew cattle to refuse to drink from the river.

West Boylston.—There is some trades-pollution, but it is so small that it cannot be detected in the water by smell or taste.

Westminster.—We are situated on the height of land north of Wachusett Mountain. Our drainage and sewerage are natural, and we have no trouble at all from those imperfections found in lower towns.

Summary of Survey.

It is evident that there is not marked offensiveness in many places. In fact, a single woolen mill, discharging its refuse into the River Aire in England, employs nearly three-fourths as many operatives as the whole of the manufactories in the Nashua Basin in Massachusetts, and uses, annually, 320,000 pounds of logwood and similar dye wares; 15,000 pounds of chloride of lime, ammonia, and oil of vitriol; 40 to 50 tons of Gallipoli oil; 700,000 pounds of soap; and 14,000 tons of coal. It would be within bounds, too, probably, to say that the sewage of less than 10,000 people is cast directly into the Nashua and its tributaries within the State; but in a few places the pollution is so great as to demand interference.

In Shirley and Townsend there is complaint of the obstruction of streams from sawdust accumulating in their beds, after having been thrown out from the mills, a difficulty most easily avoided.

The evils in the drainage of Sterling are purely of a local character.

The inhabitants of North Leominster have to shut their windows at times to keep out of their houses the vile odors from the brook, contaminated by a tannery in that village; but the population is sparse, and it is not positively known that any serious ill health has been caused.

In Leominster Centre, the only sewer of the town empties into a mill-pond, which catches, also, to some extent, the insoluble refuse from the mills above it, and a nuisance is the natural result; but it has not yet given rise to much serious complaint.

Nookagee Brook, in Fitchburg, is black and filthy, but not stinking. The stream has a rapid fall over a bed rocky in its upper part, and is, immediately on its junction with the main stream, diluted with so large a quantity of water as to lose, to a considerable degree, its unsightly appearance after flowing a half-mile. Through the city the river is rather dark and sometimes turbid, but not often really foul-smelling, as is shown also by chemical examination. Punch Brook, however, a shallow stream, hardly a couple of feet wide, as it passes through the more thickly inhabited part of Fitchburg, is defiled by the privies, water-closets, etc., on its banks, thus creating a nuisance with which it will be difficult to deal satisfactorily unless filth is kept entirely out of the stream; for, during freshets, several hundred times as much water passes through it as in time of drought. The main sewer discharges lower still, but quite near the city. At present the amount of sewage is small; at times it has hardly even any color. But if the whole refuse of the houses is ever discharged at this point, it is pretty sure to cause more or less complaint in the future.

In Clinton a serious source of offence is in Quilt Pond, in the very centre of the town, which is not only polluted by the refuse of the carpet mills and gas works, and by the sewage of the town itself, but is a veritable settling-tank, dammed by the mill of the yarn company below, and placed by nature in the bottom of a deep valley. Of course the inhabitants suffer from the stenches, some having removed from the vicinity; and the water is valueless to the yarn company except for power. Even for this latter purpose, its supply is so uncertain that steam is chiefly used. The evil has been greater, too, during the past summer, from the fact that the destruction of the carpet company's dam opened a new course for the stream below, so that now Quilt Pond has not even the benefit of the overflow of the dam to partially flush it. In this case there are several interests to consult and several parties to blame. The carpet company empty a large amount of vile stuff into the stream, and the town adds to the pollution by their sewer and their surface-drainage; but both of these might, perhaps, pass off without causing a serious nuisance were they not caught and kept by the dam of the yarn company. It is easy to see where and how a simple remedy could be effected, but there will naturally be some question as to who shall bear the brunt of the cost.

Chemical Examinations.

The following tables give the results of the examinations by Prof. Nichols. In Table VI., the condition of the river is shown in Nos. 1 to 14, when it was at moderate height; in Nos. 15 to 29, at its lowest summer flow, and in Nos. 30 to 40, at low summer flow. Tables VIII. and IX. are compiled from Table VI. Prof. Nichols's notes are as follows. His methods of analysis were fully given on page 174 of the seventh report.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
November 3, 1876.

DR. CHARLES F. FOLSOM, *Sec'y of the State Board of Health.*

DEAR SIR:—I present, herewith, the report of the examination of the specimens of water from the Nashua River Basin received at several different times. Those included in Nos. 1 to 14, I assisted, myself, in collecting. The others were collected by yourself, and received by me in sealed demijohns, apparently in good order. With reference to the results of the chemical examination, I may say,—

No. 5 (Quilt Pond) was very foul. The water was covered with an oily scum. The large amount of ammonia is no doubt due in part to the gas works which drain into the pond, and is an underestimate of the amount in the water when collected, as the ammonia was continually escaping. In fact, exposure to the air during the process of filtering caused a considerable decrease in the amount of ammonia. In addition to the gas works residue, there was evidence of other contamination, of an animal character, of the nature of grease and soap, no doubt coming from the carpet factory.

No. 7 (Tannery Brook, North Leominster) was the foulest of the examples examined. It had an odor of sulphuretted hydrogen, and contained much animal matter. No. 8, taken lower down on the same brook, was not as bad as No. 7, and quite clear to the eye, but still was very foul, as the chemical examination shows.

With reference to the remaining waters [of Nos. 1 to 14], it may be said, that, owing to recent rain, the river above the Lancaster Mills, as well as below, appeared somewhat turbid; the amount of suspended matter was, however, very slight, and in a small quantity of the water hardly perceptible. Therefore, the distinction between "filtered" and "unfiltered" has no significance, as far as the "solid residue" is concerned, in the case of Nos. 1–4, 6, 9–11, 13, 14. No. 12 was considerably polluted, as was evident from its appearance and from the chemical examination, and the river was in scarcely better condition below Fitchburg (No. 13). Further down on the stream, however, there was a manifest improvement (No. 14).

Of the waters received September 14–16 (Nos. 15–29), no one had sufficient suspended matter to make its determination of any moment. They were all slightly colored, but not to a marked degree.

Of the waters received October 10, No. 31 was quite foul. The water was quite turbid, and, even after filtration through paper, was somewhat opalescent. The suspended matter submitted to microscopical examination showed, besides some particles of mineral matter and cotton and linen fibres (due, I presume, to paper mills above), a considerable number of filamentous algæ of the genus Leptothrix, the growth of which was no doubt induced by the decaying vegetable matter. The water was strongly alkaline, and contained a marked amount of sulphate of lime.

Nos. 32, 33, and 34 were similar to No. 31, although much less foul and containing less matter in suspension; No. 34 having, in fact, almost none. No. 35 was quite different from the others, as appears plainly in the table. No. 36 was very foul, and evidently, judging from the odor and from chemical examination, received the drainage from gas works. The water smelt strongly of coal-tar; it was very alkaline, and contained so much ammonia that it fumed when brought into the neighborhood of chlorhydric or nitric acid. A part of this ammonia escapes as free ammonia or carbonate during the evaporation. The remainder is driven off as ammonium salts when the residue is burned, and this accounts for the large amount of "Organic and Volatile Matter." The water contained, also, a trace of sulphuretted hydrogen (or rather of sulphide of ammonium).

Of the waters received October 31, Nos. 39 and 40 were clear, and but slightly colored. Nos. 37 and 38 were turbid, had a bad odor, and showed evident signs of refuse matter. No. 37 resembles other specimens from the same locality. No. 38 is, in fact, dilute sewage.

With reference to the acidity or alkalinity, I did not observe anything of note except in the foul waters noted, where the alkaline reaction was very strong. I did not observe any case where there was acidity (except that due to the carbonic acid in solution). I think it very seldom, unless near to chemical works, that we should be at all likely to find an acid reaction, although in the Taunton Valley we did once find it so below some iron works.

In reply to your question concerning the significance of chemical examinations, I would say that it has always been felt that the most important point in the examination of a water is to determine as far as possible the nature and amount of the organic matter present. One of the oldest methods is to determine the *loss on ignition*. The solid residue left by evaporation is heated to destroy the organic matter, and the loss noted. If a water contains little carbonate of lime and only a small amount of nitrates and chlorides, this determination is not without value, and it is quite universally the custom in this country to make it and to tabulate the result as "organic and volatile matter." I have included these results in my tables. Conscious of the defects, and, in some cases, the absolute worthlessness of this determination, chemists have tried to devise other means of reaching an idea of the organic matter present.. One which has been for a long time in use is to oxidize the organic matter by means of permanganate of potash, and to tabulate the amount of oxygen thus required. Some German chemists are in the habit of multiplying the amount of oxygen by five, and calling the result "organischer Substanz." This is entirely empirical, and in peaty waters absolutely inapplicable, and it appears better, in all cases, to state simply the amount of oxygen. The truth is, we know very little of the nature of the organic matter in natural water, and it is impossible by any means to state the exact *amount* ; and if it were possible, we should still be in the dark as to the kind,—a small amount of one kind being of more significance than a large amount of another kind. Feeling, however, that it is to the *nitrogenous* organic matter that the most importance attaches, Frankland burns the residue of evaporation with the idea of determining the amount of ("organic") *nitrogen* and *carbon*, and the relative proportion in which they exist in the organic matter present. While the method is much the most troublesome and difficult of those in common use, it is a question whether the results are proportionately valuable, as they are, after all, even if perfectly accurate, like all other determinations of the organic matter, *simply comparative, and having no fixed and absolute significance.*

Most bodies containing nitrogen, if heated with a strongly alkaline solution of permanganate of potash, give off a certain amount of their nitrogen as ammonia. This amount is constant for any one substance, but different organic substances disengage a different amount of ammonia. The ammonia obtained by this treatment is called "*albuminoid ammonia*," because the nitrogenous bodies from which it is derived are regarded as being in some sense of the nature of albumin.

Natural waters vary, of course, in the amount of organic matter they contain; a river like the Merrimac and one like the Taunton being very different, and to use the determination as an index of pollution we must know the character of the water. A well-water should give almost none, while a peaty water would give considerable, as peat contains considerable nitrogen in combinations somewhat readily destroyed. It follows that while the results of any one chemist are comparable among themselves, they cannot be compared exactly with those of some one working by different methods. Other determinations have been made of English waters, although all the analyses made by the last River Pollution Commission have been made by Frankland's methods.

Yours respectfully,

WM. RIPLEY NICHOLS.

TABLE VI.—*Examination of Waters of Nashua River Basin.*

[Results expressed in Parts per 100,000.]

Number.	Date of Collection.	LOCALITY ON MAP.	Date Received.	UNFILTERED WATER.					Chlorine.	FILTERED WATER.				
				Ammonia.	"Albuminoid Ammonia."	Solid Residue.				Ammonia.	"Albuminoid Ammonia."	Solid Residue.		
						Inorganic.	Organic and Volatile.	Total at 212° Fahrenheit.				Inorganic.	Organic and Volatile.	Total at 212° Fahrenheit.
1	Aug. 3, . . .	h., ...	Aug. 4, . .	0.0088	0.0179	2.72	2.00	4.72	0.16	0.0088	0.0179	2.72	1.80	4.52
2	3, . .	g., ...	4, . .	0.0080	0.0173	2.44	1.72	4.16	0.18	0.0080	0.0173	-	-	-
3	3, . .	g., ...	4, . .	0.0067	0.0168	3.16	1.84	5.00	0.17	0.0067	0.0160	-	-	-
4	3, . .	f., ...	4, . .	-	-	-	-	-	0.16	0.0064	0.0195	3.00	1.92	4.92
5	3, . .	i., ...	4, . .	0.1988	0.2100	18.36	7.68	26.04	2.20	0.1284	0.0832	18.40	4.80	23.20
6	3, . .	k., ...	4, . .	-	-	-	-	-	0.24	0.0069	0.0157	2.08	1.56	3.64
7	3, . .	p., ...	4, . .	1.4700	0.2500	84.00	10.20	94.20	39.40	-	-	-	-	-
8	3, . .	o., ...	4, . .	0.1780	0.0180	49.32	2.52	51.84	23.10	-	-	-	-	-
9	3, . .	r., ...	4, . .	0.0067	0.0240	2.32	1.60	3.92	0.12	0.0059	0.0115	-	-	-
10	3, . .	n., ...	4, . .	0.0096	0.0264	2.28	1.92	4.20	0.22	0.0096	0.0160	-	-	-
11	4, . .	w., ...	5, . .	0.0085	0.0179	2.28	1.60	3.88	0.12	0.0085	0.0168	2.20	1.60	3.80
12	4, . .	G., ...	5, . .	0.0080	0.0419	6.96	3.88	10.84	0.64	0.0083	0.0243	5.52	3.20	8.72
13	4, . .	t., ...	5, . .	0.0181	0.0307	7.30	2.80	10.10	0.50	0.0181	0.0304	-	-	-
14	4, . .	u., ...	5, . .	0.0184	0.0259	5.17	2.29	7.46	0.48	0.0184	0.0259	4.64	2.56	7.20
15	Sept. 13, . .	g., ...	Sept. 14, . .	0.0005	0.0165	-	-	-	0.24	0.0005	0.0107	2.80	1.40	4.20
16	13, . .	e., ...	14, . .	0.0056	0.0173	-	-	-	0.96	0.0056	0.0168	5.48	1.68	7.16
17	13, . .	E., ...	14, . .	0.0019	0.0168	-	-	-	0.50	0.0019	0.0112	3.76	1.72	5.48
18	13, . .	d., ...	14, . .	0.0061	0.0160	-	-	-	0.24	0.0061	0.0133	2.88	1.00	3.88
19	13, . .	m., ...	14, . .	*	*	-	-	-	*	0.0160	0.0176	6.28	2.16	8.44
20	13, . .	e′., ...	14, . .	0.0093	0.0162	-	-	-	0.91	0.0093	0.0162	5.08	1.96	7.04
21	14, . .	c′., ...	14, . .	0.0053	0.0157	-	-	-	0.11	0.0053	0.0144	2.20	1.80	4.00
22	14, . .	C., ...	14, . .	0.0005	0.0123	-	-	-	0.36	0.0005	0.0112	3.56	1.28	4.84
23	14, . .	C., ...	14, . .	0.0059	0.0141	-	-	-	0.41	0.0059	0.0141	3.52	1.68	5.20
24	14, . .	B., ...	15, . .	0.0155	0.0377	-	-	-	0.38	0.0155	0.0272	5.92	2.20	8.12

25	Sept. 14,	b.,	Sept. 15,	0.0066	0.0147	–	–	–	0.18	0.0066	0.0128	1.56	1.92	3.48
26	14,	A.,	15,	0.0056	0.0149	–	–	–	0.40	0.0056	0.0136	2.84	2.04	4.88
27	14,	b'.,	15,	0.0051	0.0125	–	–	–	0.15	0.0051	0.0115	3.16	1.72	4.88
28	15,	A A.,	16,	0.0128	0.0189	–	–	–	0.41	0.0128	0.0181	2.64	1.80	4.44
29	15,	A A.,	16,	0.0160	0.0168	–	–	–	0.40	0.0160	0.0186	3.44	1.88	5.32
30	Oct. 10,	z.,	Oct. 10,	0.0040	0.0259	5.00	2.84	7.84	0.38	0.0040	0.0253	4.36	2.24	6.60
31	10,	y.,	10,	0.0053	0.0323	10.44	6.12	16.56	1.28	0.0053	0.0315	8.56	4.32	12.88
32	10,	G.,	10,	0.0045	0.0317	7.04	3.80	10.84	0.75	0.0045	0.0237	5.36	3.08	8.44
33	10,	u'.,	10,	0.0056	0.0304	5 08	2.84	7.92	0.64	0.0056	0.0224	4.76	2.84	7.60
34	10,	u.,	10,	0.0040	0.0261	–	–	–	0.68	0.0040	0.0256	5.12	2.32	7.44
35	10,	s.,	10,	0.0045	0.0117	2.52	0.96	3.48	0.37	0.0045	0.0104	2.48	0.72	3.20
36	10,	near u.,	10,	15.2000	0.0797	8.44	8.48	16.92	2.76	13.6000	0.0797	–	–	–
37	31,	G.,	31,	0.0059	0.0317	6.72	4.08	10.80	1.12	0.0059	0.0309	5.40	4.04	9.44
38	31,	v.,	31,	0.5440	0.1493	10.84	6.52	17.36	2.21	0.5440	0.0795	9.48	4.32	13.80
39	31,	w'.,	31,	0.0021	0.0088	1.68	0.84	2.52	0.22	0.0021	0.0085	1.48	0.88	2.36
40	31,	z'.,	31,	0.0037	0.0117	1.64	1.20	2.84	0.15	0.0037	0.0117	1.60	1.04	2.64

* These determinations could not be made, as the demijohn containing No. 19 was broken in transit, and the water had in part escaped. Another sample was sent by our medical correspondent, taken January 26, 1877, from a point a little lower down, when the mills were in full operation. It was neither acid nor essentially different, except, perhaps, in the amount of "albuminoid ammonia," from No. 19. It contained in 100,000 parts of unfiltered water: ammonia, 0.0186; "albuminoid ammonia," 0.0648; inorganic, 6.20; organic and volatile, 3.10.

TABLE VII.—*Appearance and Locality of Samples in the previous Table.*

Number.	Appearance.	Locality.
1	Clean,	Clinton, above Lancaster mills.
2	Dark, but not foul,	Clinton, below Lancaster mills, at first railroad bridge, left side of stream.
3	Dark, but not foul,	Clinton, same as No. 2, at right side of stream.
4	Clean,	Clinton, below comb factory.
5	Foul and stinking,	Clinton, Quilt Pond in the centre of the town, into which the carpet mills and gas works drain.
6	Nearly clear,	Clinton, mill pond above carpet mills.
7	Very foul,	N. Leominster Brook, one-quarter mile below tannery.
8	Foul,	Same as No. 7, one-half mile lower, where the brook enters the river.
9	Clear,	Leominster, above upper comb factory.
10	Clear,	Leominster, below all factories.
11	Clear,	Fitchburg, Nookagee Brook, above upper woolen mill.
12	Almost clear,	W. Fitchburg, below junction of Nookagee Brook and river.
13	Dark and turbid,	Fitchburg, at railroad bridge, above sewer mouth.
14	Clear,	South Fitchburg, below scythe shop.
15	Dark and turbid,	Middle of railroad bridge, below Lancaster mills.
16	Clear,	North Branch Nashua River, one-quarter mile above junction.
17	Clean,	Nashua River, twenty rods below junction of North and South branches.
18	Clean,	South Branch Nashua River, one-quarter mile above junction.
19	Discolored,	North Branch, just below shoe shank manufactory.
20	Clean,	North Branch, ten rods below cotton mills.
21	Clear,	Catecunamug Brook, one-quarter mile below all mills.
22	Clear,	Nashua, just below junc'n with Squanacook, left side.
23	Clear,	Nashua, just below junc'n with Squanacook, right side.
24	Nearly clear,	Nashua, just below Pepperell.
25	Clean,	Nissitisset, just below Pepperell.
26	Clean,	Nashua, one-quarter mile before State line.
27	Dark and peaty,	Nissitisset, one-half mile below State line.
28	Not bad,	Nashua, one-eighth mile before entering Merrimac, below all mills and gas works, one-eighth mile below latter.
29	Not bad,	
30	Dirty, but not foul,	N. Branch Nashua River, just above Nookagee Brook.
31	Filthy,	Nookagee Brook, just above Nashua River.
32	Somewhat turbid,	Below junction of 30 and 31, same as 12.
33	Less turbid,	Fitchburg bridge, at upper end of city proper.
34	Dark,	Railroad bridge, at lower end of city, same as 13.
35	Clear,	Baker's Brook.
36	Very foul,	Drainage of gas works, a few feet from outlet into small pond.
37	Foul and turbid,	Fitchburg, Nashua River below Nookagee Brook, same as 12 and 32.
38	Very foul,	Fitchburg, Punch Brook.
39	Very clear,	West Fitchburg, Nookagee Brook, above all dams.
40	Very clear,	West Fitchburg, North Branch, above all dams.

The samples taken below Nashua were not as foul in appearance as is said to be sometimes the case; but, of course, this differs from time to time. In Fitchburg, for instance, three samples (12, 32, and 37) taken from the same place, but at different times, are described as "almost clear," "somewhat turbid," and "foul and turbid."

Table VIII. (see p. 56) gives a general sketch of the river from its sources to its final discharge into the Merrimac River, being about thirty-two miles from the latter point to the junction of the north and south branches; and thence eighteen miles to the point z′ in Fitchburg, and thirteen to Still River in Boylston.

In Table IX., a few of the worst specimens have been placed together for ready comparison, representing the condition of the water in those few places where it was found excessively bad. The drainage from the gas works at Fitchburg, although very foul, passes only indirectly into the river, much of it only after percolating through sand and gravel. Most of the ammonia, too, probably escapes into the open air.

TABLE VIII.—*Examination of Nashua River.*

[Results expressed in Parts per 100,000.]

	Number.	Locality on Map.	CONDITION.	Ammonia.	"Albuminoid Ammonia."	Solid Residue. Inorganic.	Solid Residue. Organic and Volatile.	Solid Residue. Total at 212° F.	Chloride.	Appearance.	Remarks.
Nashua Riv., S. Br.	1	h.	Unfiltered, .	0.0088	0.0179	2.72	2.00	4.72	0.16	-	Clinton from the raceway above Lancaster Mills.
			Filtered, .	0.0088	0.0179	2.72	1.80	4.52	-	Clear.	
	6	k.	Unfiltered, .	-	-	-	-	-	0.24	Clear.	Clinton from the carpet company's pond.
			Filtered, .	0.0069	0.0157	2.08	1.56	3.64	-	-	
	18	d.	Unfiltered, .	0.0061	0.0160	2.88	1.00	3.88	0.24	Clean.	S. Br. of Nashua River, below all mills.
			Filtered, .	0.0061	0.0133	-	-	-	-	-	
Nashua River, North Branch.	40	z′	Unfiltered, .	0.0037	0.0117	1.64	1.20	2.84	0.15	Clear and sparkling.	North Branch of Nashua River above the last dam in West Fitchburg.
			Filtered, .	0.0037	0.0117	1.60	1.04	2.64	-		
	39	w′	Unfiltered, .	0.0021	0.0088	1.68	0.84	2.52	0.22	Clear and sparkling.	Nookagee Brook, West Fitchburg, above all mills.
			Filtered, .	0.0021	0.0085	1.48	0.88	2.36	-		
	9	r.	Unfiltered, .	0.0067	0.0240	2.32	1.60	3.92	-	-	Headwaters, Leominster.
			Filtered, .	0.0059	0.0115	-	-	-	-	Clear.	
	Average of 13 and 34.	n.	Unfiltered, .	0.0110	0.0284	7.30	2.80	10.10	0.59	Dark and turbid.	Fitchburg, below city proper.
			Filtered, .	0.0110	0.0280	5.12	2.32	7.44	-		
	16	c.	Unfiltered, .	0.0056	0.0165	2.80	1.40	4.20	0.24	Clean.	North Branch of Nashua River, below all mills.
			Filtered, .	0.0056	0.0107	-	-	-	-	-	

8 Nashua River.	17	E	Unfiltered, .	0.0019	0.0168	3.70	1.72	5.48	0.50	-	Below junction of N. and S. branches.
			Filtered, .	0.0019	0.0112	-	-	-	-	Clean.	
	Average of 22 and 23.	C	Unfiltered, .	0.0032	0.0132	3.54	1.48	5.02	0.39	-	Below junction with Squanacook River.
			Filtered, .	0.0032	0.0127	-	-	-	-	Clean.	
	24	B	Unfiltered, .	0.0155	0.0307	5.92	2.20	8.12	0.38	Nearly clear.	Below Pepperell.
			Filtered, .	0.0155	0.0272	-	-	-	-		
	26	A	Unfiltered, .	0.0056	0.0149	2.84	2.04	4.88	0.40	-	State line.
			Filtered, .	0.0056	0.0136	-	-	-	-	Clean.	
	Average of 28 and 29.	AA	Unfiltered, .	0.0144	0.0179	3.04	1.84	4.88	0.41	Not bad.	Below Nashua, N. H.
			Filtered, .	0.0144	0.0164	-	-	-	-	-	

TABLE IX.—*Examination of Nashua River Basin.*

[Results expressed in Parts per 100,000.]

Number.	Locality on Map.	CONDITION.	Ammonia.	"Albuminoid Ammonia."	SOLID RESIDUE.			Chlorine.	Appearance.	Locality.
					Inorganic.	Organic and Volatile.	Total at 212° F.			
5	i.	Unfiltered, . . .	0.1988	0.2100	18.36	7.68	26.04	2.20	Very foul and stinking.	Quilt Pond, below carpet mill and gas works, at Clinton.
		Filtered, . . .	0.1284	0.0832	18.40	4.80	23.20	-		
7	p.	Unfiltered, . . .	1.4700	0.2500	84.00	10.20	94.20	39.40	Very foul.	One-quarter of a mile below tannery at North Leominster.
8	o.	Unfiltered, . . .	0.1780	0.0180	49.32	2.52	51.84	23.10	Foul.	Same as 7, one-half mile lower.
31	y.	Unfiltered, . . .	0.0053	0.0323	10.44	6.12	16.56	1.28	Filthy.	Nookagee Brook, Fitchburg.
		Filtered, . . .	0.0053	0.0315	8.56	4.32	12.88	-	-	
36	near u.	Unfiltered, . . .	15.2000	0.0797	8.44	8.48	16.92	2.76	Foul.	Drainage of gas works into stagnant pond, Fitchburg.
		Filtered, . . .	13.6000	0.0797	-	-	-	-	-	
38	v.	Unfiltered, . . .	0.5440	0.1493	10.84	6.52	17.36	2.21	Foul.	Punch Brook in Fitchburg.
		Filtered, . . .	0.5440	0.0795	9.48	4.32	13.80	-	-	

The Purification of Polluted Streams.

From the foregoing tables, it is seen that there is a decided, but not excessive, increase in the amount of pollution, as the outlet is approached. At the same time, it is evident that the processes of purification go on rapidly. It should be remembered, however, that the worst and most dangerous source of pollution to rivers, human excrement, is found in the Nashua at the present time only in very small quantities, as compared with the volume of the river.

The conclusion of the Rivers Pollution Commission of England, based chiefly upon laboratory experiments, but also partly on chemical examination of small streams flowing through densely populated regions, and therefore constantly subject to polluting substances, and so long accepted as authoritative, "that there is no river in the United Kingdom long enough to effect the destruction of sewage by oxidation," is certainly not fully borne out, so far as the Nashua River is considered, by the results which we have got. Our deductions, too, are confirmed by the results of many examinations by M. Dumas of the River Seine, beginning above the city of Paris and extending to Rouen some one hundred miles lower. The French method of analysis differs from that in common use in England and this country, and consists chiefly in determining the amount of free oxygen present. Of course, the oxygen would be rapidly used up by any putrescible matter coming in contact with it, and, therefore, the more oxygen present in any given sample of water, the purer must that water be.

TABLE X.—*Showing the number of centiliters of free oxygen in a liter of water from different localities in the River Seine.*

LOCALITY.	Oxygen present.
Corbeil (above Paris),	9.
Pont d'Ivry (near the upper border of the city),	8.
Pont de la Tournelle (about the middle of the city),	8.
Auteuil (suburb below city and above outlets of main sewers),	6.
Asnières (outlet of upper main intercepting sewer),	4.6
St. Denis (outlet of lower main intercepting sewer),	2.
Epinay (below all sewers),	1.
Poissy (about 17 miles below Epinay),	6.
Vernon (about 27 miles below Poissy),	9.5
Rouen (about 35 miles below Vernon),	10.5

At the International Sanitary Congress at Brussels in 1876, Mons. A. Gérardin of Paris, inspector of establishments injurious to health, read a paper* embodying the results of three thousand chemical examinations of water taken from different parts of the river Seine, and made under directions from the prefect of the police.

Examinations of eighty specimens gave the following results: At the bridge of Asnières, just below the outlet of the main intercepting sewer of Paris, there was no complaint of bad odor; fish caught there were readily eaten by cats; there were to each liter of water 6.88 cl of oxygen and 275 milligrams of solid residue, of which 61 milligrams were organic matter. Four or five kilometers lower, at the bridge of St. Denis, and just above the smaller intercepting sewer, so that there could not have been much additional pollution between the two points, there were loud complaints of stink; cats refused to eat the fish caught there; and there were to each liter of water 3.37 cl of oxygen and 280 milligrams of solid residue, of which 61 milligrams were organic matter. Here, in the two places, the organic matter was the same, so far as chemistry could detect any difference, but there evidently was the difference between nearly fresh sewage and oxidized or putrefied sewage. The relative quantities of oxygen in the two places, by subsequent examinations, were respectively 4.28 cl and 1.07 cl to the liter.

The foulness of the river reached its maximum 23 kilometers below the sewer-outlet, and then became gradually less, until, at a distance of 65 kilometers more, it had regained the degree of purity which it had before reaching Paris.

Gérardin showed that the water of the Seine was more foul near its bed than at the surface, the opposite of the case in unpolluted rivers, and attributable to the sewage deposits. The influence of the wind, temperature, barometric pressure of the atmosphere and height of the river were also shown to be considerable.

Fish were found to die in the Seine when the water contained not over 1.5 cl of oxygen to the liter; and this happened in 1874 over a distance of 26 kilometers.

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* Annales d'Hygiène Publique et de Médecine Légale, Jan., 1877, pp. 87, *et seq.*

A novel expedient is suggested for the purification of the river, and consists in having long open canals through which the sewage would flow, and in which it would be exposed to the free action of the air. It was proposed, too, to plant in these canals vigorous aquatic plants, beginning with the *Arundo Phragmites*, which grows even in the most filthy places, and placing after it, in order, the *Sparganium simplex*, the *Myriophyllum*, the *Chara*, the false cress, and, last, the water-cress, upon which are found the animalcules characteristic of pure water.

Pollution of the Nashua.

It is readily seen, that, except at the head-waters, the Nashua River is so polluted throughout its whole length that it would be unwise to use any part of it for a domestic water-supply. It is not at any place in Massachusetts, except occasionally at Fitchburg, offensive to smell, although some of its tributaries (at Clinton, Fitchburg, Leominster, and Shirley) are in a filthy condition. In fact, with the selectmen of every town in our State having the power to act as a board of health, although that power has seldom been exercised as effectively as is desirable, it would not be easy for any of our rivers to become so offensively polluted as has been not uncommon in England; for instance, where, according to the royal commissioners, the *Aire* and the *Calder* and their tributaries "are abused by passing into them hundreds of thousands of tons per annum of ashes, slag, and cinders from steam-boiler furnaces, iron works, and domestic fires; by their being made the receptacles, to a vast extent, of broken pottery and worn-out utensils of metal, refuse bricks from brick-yards and old buildings, earth, stone and clay from quarries and excavations, road-scrapings, street-sweepings, etc.; by spent dye-woods and other solids used in the treatment of worsteds and woolens; by hundreds of carcasses of animals, as dogs, cats, pigs, etc., which are allowed to float on the surface of the streams or to putrefy on the banks; and by the flowing in, to the amount of very many million gallons per day, of water poisoned, corrupted, and clogged by refuse from mines, chemical works, dyeing, scouring, and fulling worsted and woolen stuffs, skin-cleaning and tanning, slaughter-house garbage, and the sewage of houses and towns."

How far the present condition of the Nashua River, not considering the obstructions from dams, has to do with the disappearance of salmon, trout, and pickerel, it would be difficult to say: that they have been driven from many of the smaller streams, in part, at least, by the offensive matters discharged into them, there can be hardly a doubt; but the same causes have also been at work here which have driven the game from our woods,—that is, both have often been exterminated. Last year, it was reported to the Board of Health that fish had been destroyed in the river, two miles below Clinton, by the mill-refuse from that town; and in Quilt Pond even the eels have been killed. But a few rods below the outlet for the waste of the Lancaster mills, fishermen may often be seen, when the water is not low, having "quite good luck" in catching the more hardy varieties of fish. Of course, salmon cannot be expected to thrive even in a river of absolutely pure water, if it is thoroughly obstructed by high dams.

The attempt which is now making to stock the river near Lancaster village with young salmon and bass, will be followed with great interest. It is feared that the trades-pollution will destroy many, although the fact has not been proved by the experience of the past summer.

Except at Fitchburg, and just below the mills in a few other places, where the river is somewhat turbid, the *Nashua* has generally the appearance of an unpolluted stream, until it reaches the city of Nashua, N. H. To render it actually pure and free from contamination throughout, would be indeed a difficult task; and it is doubtful whether the amount of good attained would compensate for the necessary cost and inconvenience, especially as there are other sources from which water for domestic use may be got.

Some Pollution Unavoidable.

In this connection, the testimony* of Mr. Robert Rawlinson, C. E., C. B., is of especial interest, and probably expresses the opinion of the Local Government Board of

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* Before the Conference on the Health and Sewage of Towns, held by the Society of Arts, in London, May 9, 10, and 11, 1876.

England, reached after many years of study and experience in the matter.

> "The question of dealing with sewage ought not at the outset to be one of profit to the town, but of getting rid of that which was injurious to human health in the cheapest and readiest way. There were many places in Lancashire and Yorkshire where irrigation was impracticable for two reasons: one, the difficulty of obtaining land; and another, the great objection to depriving the district of its water. The manufacturing districts were so thickly planted that they must have water, dirty or clean; and there were many purposes for which dirty water could very well be used, though they would much rather have clean. How the rivers were to be cleansed was the great problem to be solved, as it was evident that the manufacturing industries could not be very much extended if the present rate of pollution went on. This pollution took place in various ways, and . . . proper regulations might very largely reduce the present evils. He should certainly tremble, however, for the trade of this country, if at first rigid chemical standards were set up and enforced, simply because it would be absolutely impossible. He held that nothing could be more injurious for a state than to enact a law which could not be obeyed. Certain restrictions might, however, be very stringent, if they were confined to special things."

Until we have better means of disposal of our refuse than at present, some of our rivers must be used, more or less, to scavenge the country; and the resulting evil, if reasonable care is used, must be very small as compared with the methods by which filth fails to be promptly and efficiently removed. Sewage-irrigation is not profitable, and, if on a large scale, is costly, while small towns, generally, cannot afford to have well-constructed sewerage-systems. The various methods of filtration or precipitation do not *purify* sewage. It is easy, however, to prevent any serious pollution which may render such streams unsightly, offensive, or unfit for ordinary purposes; and it is not necessary, in their case, that the water should be pure enough for men to drink. If it is fairly cleansed, that is as much as we can expect at present, however much we may desire something more.

Disposal of Sewage in the Nashua Basin.

The difficulties in dealing with large amounts of sewage, say of a town of ten thousand inhabitants, are at least as great, and the pecuniary loss undergone is fully as considerable, by the clarifying or chemical processes as by the purifying or irrigation method; while the former are *ipso facto* nuisances, if on a large scale, and the latter, if properly managed, do not cause bad odors. In towns, therefore, irrigation is, on all accounts, to be preferred. But with many of the mills the waste is concentrated, and either valuable in itself, or most of it is readily rendered insoluble, if not so already, and is easily separated from the water. For mills, then, unless the waste can be discharged into the town-sewers and, thus diluted, be *purified* by irrigation, the chemical processes are generally the most easily managed, and, if the works can be placed remote from dwellings, accomplish as great an amount of cleansing, with as little offence, as it is fair now in most cases to demand. Intermittent downward filtration may be used where such cleansing is insufficient.

In leather-board mills the desired object might be got at very moderate expense; in gas works, the expense of so doing may be nearly covered by saving the tar; in tanneries, a great outlay would not be required; in linen mills, the waste liquors from cleansing and bleaching would be too concentrated for use in irrigation, but they might be disposed of by intermittent downward filtration, or by precipitation; in cotton mills, the waste from bleaching and washing and dyeing could be precipitated and kept out of the rivers, although probably of not much value; the "boilings" from paper mills could probably be utilized with some pains, while the scourings from wool are very valuable and would be likely to more than repay the cost of collecting their precipitable parts. In England, much of the oil used before fulling is saved, and even finds a sale in this country. The poisonous chemicals used in dyeing are so valuable that they are economized as much as possible; the grosser dyes may be kept out of the streams by precipitation, but with some trouble. Of course the degree of concentration in all of these waste-liquids will depend considerably upon the abundance or otherwise of the supply of water in each case.

Sewage-Clarification at Walpole.

In Walpole, at an establishment for washing and bleaching cotton-waste, the refuse was so highly offensive a few years ago, that the proprietor roughly prepared a cheap set of precipitating basins by simply throwing up a wall of earth, which retains the solid matter and grease. The effluent flows through a half-dozen rods of marsh, and, at its discharge into the brook, still looks somewhat turbid; but, twenty rods lower, and before entering the river, when visited, without any previous notice, October 19, 1876, there was nothing objectionable. This arrangement has been in existence four years, during which time complaints—which had been formerly frequent—ceased. There was no stink at the time of inspection, but it is said to be a source of offence in the immediate vicinity in hot weather, although no one lives near enough to be annoyed by it.

Propriety of Legislation.

As may be seen from the pages of the last report of the State Board of Health, no laws allowing injunctions and special actions by local authorities have been successful in rendering pure the streams of England; nor should we have reason to expect a better result in this country. This position is well illustrated by what actually occurred in Clinton in 1875. A petition was sent to the local board of health in regard to the nuisance in that town from the pond already referred to. After giving the matter their careful consideration, they replied in the following words: "As the power conferred by the statutes on the board of health is, in its application to this case, in their opinion, very doubtful, it is decided to take no farther action on the petition." What is required is evidently some general Act of the Legislature applying to the whole State and placing the necessary authority in some central board.

If such an Act were passed, the question would naturally arise, What constitutes pollution sufficient to call for interference, and what remedy shall be adopted? For it would be manifestly absurd to say that present methods must be abandoned until some practicable substitute could be suggested. Of course no one system would be applicable in all cases alike. For instance, in a seaboard city like Boston, where the waste is enormous and the present nuisance great, any attempt to utilize or deodorize sewage must be attended with great pecuniary loss, and, on so great a scale, perhaps with otherwise unsatisfactory results, while it may be cast into the sea easiest and best. In Salem, evils of a similar character may be found, and the most practicable remedy would doubtless be similar. In Lynn, although on the sea, it will be extremely difficult, if possible, to find a suitable outlet for intercepting sewers. It is out of the question to discharge sewage on a beach, to be washed up on to the shore; it would be idle to attempt to dike and irrigate the flats near the city; a pumping-station discharging sewage into the Saugus River would probably be objected to by all those who frequent Revere Beach, while a nuisance would follow in Lynn itself, if any attempt were made to remove the precipitable parts of the sewage, by any of the chemical processes, near the city. What remains, then, but carrying the sewage inland, or to some of the distant marshes for irrigation, a costly if practicable method, or restricting the use of water-closets, at least their connection with sewers, and emptying vaults and cesspools, by some of the odorless processes now in use in large cities and by systems of "dry removal"? The problem, certainly, is a difficult one, and is not likely to be solved in the best manner without careful consideration of the present and future wants of the city. In Natick, where the water-supply of our largest city is endangered, something should be done at once, and irrigation seems the only real remedy, as also in Worcester. In small villages with few or no sewers, probably nothing would be gained by compelling them to keep their drainage out of streams such as are not used now, or are not likely to be used in the future, as water-supplies. The same mill might be a serious nuisance on a small or sluggish stream, and of no consequence on a large or rapid river, especially if near the sea.

THE NASHUA RIVER BEYOND THE STATE LINE.

After leaving our State, the *Nashua* is polluted only by the waste of a city of 12,000 inhabitants in New Hampshire. On the Nissitisset, in that State, the pollution is quite small. In Nashua, there are on the river two large cotton mills, two small dye-houses, one card and glazed-paper mill, the gas works, and several other mills of various kinds, which can hardly be considered as sources of contamination to the water.

The upper cotton mill—the Nashua—employs 1,100 hands, has 75,000 spindles, and, with a fall of 34 feet, uses the water for power and for washing the cloth. The trades-pollution above does not seriously affect this company, as they are some eight miles below the nearest mills above them. No dyeing is done; in the other processes, lime, sulphuric acid (the two probably nearly neutralizing each other in the bleaching), and soap are used. The amount of stock converted into cloth yearly is, in round numbers, 5,000,000 pounds.

The Jackson Company, perhaps a half-mile lower on the river, use only clean cotton, and do no dyeing or bleaching. They have a fall of 18 feet, employ 450 hands, with 22,000 spindles, and, as the river serves only for power for them, they are not seriously affected by the dye works, paper mill, etc., above them. The board of health of Nashua, in kindly replying to our circular, state that the pollution of the river consists, in that city, of lime, dyestuffs, excrement, street-washings, etc., and the poisonous chemicals from the card and glazed-paper mill.[*] They also state, "Below the mills, on the Nashua River, the water is almost black, is unfit to drink, and in very hot weather is sometimes odorous, but not to the extent of causing general complaint." A large portion of the town sewage finds its way into the river, and, quite below the settled parts, the gas works pour a considerable amount of offensive matter into its current.

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[*] Four tons of paper are used per day; the chemicals used are Paris green, blue vitriol, acetate of lead, arsenious acid, bichromate of potash, carbonate of baryta, sal-soda, sulphuric acid, muriatic acid, clay, magenta, and other aniline colors, coralline, and various dyewoods.

POLLUTION OF THE MERRIMAC.

This amount of filth passes into the Merrimac, a river draining a large part of the State of New Hampshire, including the cities of Concord and Manchester; and we might expect to get full evidence of contamination at Lowell and Lawrence. And yet the numerous analyses which have been made in previous years show no very striking amount, although the mere fact of this sewer-character of the river, especially with the knowledge that it is likely to increase rather than diminish, should render its use allowable as drinking-water only on the ground of necessity. It is now used for that purpose to some extent in Lowell, Lawrence, and Haverhill.

It should be remembered in this connection, however, that it is *quantity*, and not *quality*, of impurity which we detect by chemical analysis; and that it is the general opinion of authorities, that water containing an amount of impurity so small as to escape the tests of the chemist altogether, may possess such virulent character, from containing the contagium of specific diseases, as to be unfit for drinking.

To purify the Merrimac River, so that it would, without treatment, be desirable as a domestic water-supply, would require the vigorous coöperation of the authorities of two States in an amount of compulsory legislation which we could hardly now expect to see enforced. The cities just named, however, must get their water-supplies from the Merrimac, in part at least, or else incur enormous expense; and if the water were carefully filtered, as it is not now, before being used, we should not be justified in condemning it, however much we should prefer a supply that had not been so exposed to contamination, especially in view of the fact that London, which has the lowest death-rate of all the large cities of the world, gets sixteen-seventeenths of its water, but filtered, from rivers much more polluted than the Merrimac.

In view of the above facts, the importance is readily seen of preventing any farther fouling of the Nashua and Merrimac rivers, although it must be acknowledged that, so far as chemical analysis goes, the latter compares now very favorably with waters of standard purity,* as may be seen by the following table (page 70), calculated from the examinations by Professor Nichols in the Fifth Report of the State Board of Health, and by Professor Wood in the Report upon the Sanitary Qualities of the Sudbury, Mystic, Shawshine, and Charles River Waters:—

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* It is said that typhoid fever, which was formerly more prevalent in Lawrence, has become comparatively rare since the introduction of the water from the Merrimac River. This point has not yet been specially investigated, however, by the writer.

TABLE XI.—*The Merrimac and other Waters.*

[Results expressed in Parts per 100,000.]

	Ammonia.	"Albuminoid Ammonia."	SOLID RESIDUE.			Chlorine.	
			Inorganic.	Organic and Volatile.	Total at 212 deg. Fahr.		
Lowell, above dam, Merrimac River,	0.0047	0.0114	2.21	1.75	3.96	0.14	Average of 9 samples.
Lawrence, above dam, Merrimac River,	0.0044	0.0102	2.41	1.69	4.09	0.19	Average of 12 samples.
Water-supply of Boston, Cochituate Lake,	0.0035	0.0113	2.84	2.06	4.90	0.32	Average of 7 samples.
Water-supply of Boston, Sudbury River,	0.0022	0.0180	3.95	2.75	6.70	0.62	Average of 4 samples.
Head-waters of the Nashua River (Clinton),	0.0088	0.0179	2.72	2.00	4.72	0.16	- -
Head-waters of the Nashua River (West Fitchburg),	0.0021	0.0088	1.68	0.84	2.52	0.22	- -

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EFFECT OF FARMING, PERCOLATION, ETC.

The influence of high cultivation of farm-lands in polluting streams running through them, has been often referred to, and many experiments bearing on the question have been made during the last quarter of a century by Dalton, Dickinson, Frankland, Lawes and Gilbert, Greaves, and Voelcker in England; Gasparin, and Marié-Davy in France; Maurice, and Risler in Switzerland; and Ebermayer, and Woldrich in Austria, who all come to pretty much the same conclusions as to evaporation and percolation as compared with rainfall.

Mr. Charles Greaves, C. E., Consulting Engineer of the East London Water Works, has recently published a *résumé* of experiments* very carefully conducted by him during the past twenty-two years, from which the general results observed, are: "The magnitude of percolation through sand at all times; the smallness of percolation through earth on the whole; the consequent magnitude of evaporation; the entire absence of percolation in warm summer weather; the excess of evaporation from ground over evaporation from a surface of water in winter, and from a surface of water over evaporation from ground in summer," etc. During the last fourteen years only were all the facts given in the following table observed, and the averages for that time are as follows:—

TABLE XII.

RESULTS FOR FOURTEEN YEARS.	Inches.
Average annual rainfall, ...	25.721
percolation through ground, . . .	7.582
evaporation from ground, ...	18.138
evaporation from water, ...	20.613
evaporation from sand, ...	4.313
excess of rain over evaporation from water,	5.108
excess of evaporation from water over evaporation from ground, ...	2.475

In making these experiments, the "ground" used was put in a slate box of one cubic yard capacity, and was made as nearly as possible like ordinary ground, but not exactly so. The interesting point with reference to the pollution of streams is the small amount of rainfall which actually passes through the soil, and the entire absence of percolation, in summer. If lands are heavily manured in a fall followed by a wet winter, of course the percolation, and consequent escape into streams, would be very much greater than if the winter were dry; in the former case, spring is the better time for manuring land, and, in the latter, autumn. Dr. Gilbert thinks that "when the matters had passed through a considerable depth of soil, there was not so much danger from ordinary agriculture as was sometimes supposed." He also gives the results of experiments at Rothamsted, England,* extending from 1866 to 1873, in which the drains were opened from time to time at different periods of the year, and the water analyzed either by Professor Frankland or Dr. Voelcker. Wheat had been grown on the land since 1844. The average of their results is thus stated, the depth of the drains being between three and four feet.

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* These, the most complete in existence, may be found in the forty-fourth volume of the Minutes of the Proceedings of the Institution of Civil Engineers, London, 1876.

TABLE XIII.

One Acre of Land treated with—	Number of Experiments.	Nitrogen as Nitrates and Nitrites per 100,000 parts of drainage-water (average).
No manure for years,	11	0.353
Fourteen tons barn manure each year,	6	1.264
Mineral manure,	11	0.428
Mineral manure and ammonia salts (41 lbs. nitrogen),	11	0.823
Mineral manure and ammonia salts (82 lbs. nitrogen),	11	1.439
Mineral manure and ammonia salts (123 lbs. nitrogen),	11	1.815
Mineral manure and nitrate of soda (82 lbs. nitrogen),	10	1.437

Such high manuring is not common in ordinary farming; and where there are no drains, the filtration would be slower, and the effluent water would become nearly pure. In sand or gravel, too, the result would be much less satisfactory than in denser soils.

These examinations are given in full in the final report of the English Rivers Pollution Commission, who conclude from them that "water collected from the surface, or the drains of cultivated land, is always more or less polluted with the organic matter of manure, even after subsidence in lakes or reservoirs. Such *polluted surface* or *drainage water* is not of good quality for domestic purposes; but it may be used with less risk to health than polluted shallow-well water, if human excrementitious matters do not form part of the manure applied to the land."

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* Op. cit.

It is well known that all river-water contains a variable amount of soluble matter and of substances in suspension, valuable as a fertilizer; and in some river-valleys this is so great that no other manure is needed. Further experiments on these points are evidently desirable.

LEGISLATION IN ENGLAND.

An Act passed in England during the past year is of sufficient interest in connection with this subject to be given entire. It has not fully met with the approval of all the sanitarians; but more stringent bills have failed to go through both houses of Parliament; and Mr. Sclater-Booth, President of the Local Government Board, the office where the bill was drawn up, was fully convinced that the people of that country are not ready for any more advanced measures now. He thought it better to be satisfied with a moderate gain that is practicable, and which will make a vast improvement in the rivers, rather than leave the evil in its present magnitude until all the requirements of sanitary law could be fulfilled in a better Act.

In Massachusetts, we are chiefly interested in *preventing* the contamination of our streams, although in Boston, Brookline, Cambridge, Clinton, Fall River, Fitchburg, Haverhill, Lynn, Natick, Salem, Somerville, Woburn, and Worcester evils of some magnitude are already staring us in the face. On a smaller scale, there are local nuisances in many parts of the State.

[39 and 40 Vict. chap. 75.]

AN ACT for making further Provision for the Prevention of the Pollution of Rivers.

[15th August, 1876.]

Whereas it is expedient to make further provision for the prevention of the pollution of rivers, and in particular to prevent the establishment of new sources of pollution:

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. This Act may be cited for all purposes as the Rivers Pollution Prevention Act, 1876.

PART I.

Law as to Solid Matters.

2. Every person who puts, or causes to be put or to fall, or knowingly permits to be put or to fall or to be carried into any stream, so as either singly or in combination with other similar acts of the same or any other person to interfere with its due flow, or to pollute its waters, the solid refuse of any manufactory, manufacturing process or quarry, or any rubbish or cinders, or any other waste, or any putrid solid matter, shall be deemed to have committed an offence against this Act.

In proving interference with the due flow of any stream, or in proving the pollution of any stream, evidence may be given of repeated acts which together cause such interference or pollution, although each act taken by itself may not be sufficient for that purpose.

PART II.

Law as to Sewage Pollutions.

3. Every person who causes to fall or flow or knowingly permits to fall or flow or to be carried into any stream any solid or liquid sewage matter, shall (subject as in this Act mentioned) be deemed to have committed an offence against this Act.

Where any sewage matter falls or flows or is carried into any stream along a channel used, constructed, or in process of construction at the date of the passing of this Act for the purpose of conveying such sewage matter, the person causing or knowingly permitting the sewage matter so to fall or flow or to be carried shall not be deemed to have committed an offence against this Act if he shows to the satisfaction of the court having cognizance of the case that he is using the best practicable and available means to render harmless the sewage matter so falling or flowing or carried into the stream.

Where the Local Government Board are satisfied after local inquiry that further time ought to be granted to any sanitary authority which at the date of the passing of this Act is discharging sewage matter into any stream, or permitting it to be so discharged, by any such channel as aforesaid, for the purpose of enabling such authority to adopt the best practicable and available means for rendering harmless such sewage matter, the Local Government Board may by order declare that this section shall not, so far as regards the discharge of such sewage matter by such channel, be in operation until the expiration of a period to be limited in the order.

Any order made under this section may be from time to time renewed by the Local Government Board, subject to such conditions, if any, as they may see fit.

A person other than a sanitary authority shall not be guilty of an offence under this section in respect to the passing of sewage matter into a stream along a drain communicating with any sewer belonging to or under the control of any sanitary authority, provided he has the sanction of the sanitary authority for so doing.

PART III.

Law as to Manufacturing and Mining Pollutions.

4. Every person who causes to fall or flow or knowingly permits to fall or flow or to be carried into any stream any poisonous, noxious, or polluting liquid proceeding from any factory or manufacturing process, shall (subject as in this Act mentioned) be deemed to have committed an offence against this Act.

Where any such poisonous, noxious, or polluting liquid as aforesaid falls or flows or is carried into any stream along a channel used, constructed, or in process of construction at the date of the passing of this Act, or any new channel constructed in substitution thereof, and having its outfall at the same spot, for the purpose of conveying such liquid, the person causing, or knowingly permitting the poisonous, noxious, or polluting liquid so to fall or flow or to be carried, shall not be deemed to have committed an offence against this Act if he shows to the satisfaction of the court having cognizance of the case that he is using the best practicable and reasonably available means to render harmless the poisonous, noxious, or polluting liquid so falling or flowing or carried into the stream.

5. Every person who causes to fall or flow, or knowingly permits to fall or flow, or to be carried into any stream, any solid matter from any mine in such quantities as to prejudicially interfere with its due flow, or any poisonous, noxious, or polluting solid or liquid matter proceeding from any mine, other than water in the same condition as that in which it has been drained or raised from such mine, shall be deemed to have committed an offence against this Act, unless in the case of poisonous, noxious, or polluting matter he shows to the satisfaction of the court having cognizance of the case that he is using the best practicable and reasonably available means to render harmless the poisonous, noxious, or polluting matter so falling or flowing or carried into the stream.

6. Unless and until Parliament otherwise provides, the following enactments shall take effect, proceedings shall not be taken against any person under this part of this Act save by a sanitary authority, nor shall any such proceedings be taken without the consent of the Local Government Board: Provided, always, that if the sanitary authority, on the application of any person interested alleging an offence to have been committed, shall refuse to take proceedings, or apply for the consent by this section provided, the person so interested may apply to the Local Government Board, and if that Board, on inquiry, is of opinion that the sanitary authority should take proceedings, they may direct the sanitary authority accordingly, who shall thereupon commence proceedings.

The said Board, in giving or withholding their consent, shall have regard to the industrial interests involved in the case, and to the circumstances and requirements of the locality.

The said Board shall not give their consent to proceedings by the sanitary authority of any district which is the seat of any manufacturing industry, unless they are satisfied, after due inquiry, that means for rendering harmless the poisonous, noxious, or polluting liquids proceeding from the processes of such manufactures are reasonably practicable and available under all the circumstances of the case, and that no material injury will be inflicted by such proceedings on the interests of such industry.

Any person within such district as aforesaid, against whom proceedings are proposed to be taken under this part of this Act, shall, notwithstanding any consent of the Local Government Board, be at liberty to object before the sanitary authority to such proceedings being taken, and such authority shall, if required in writing by such person, afford him an opportunity of being heard against such proceedings being taken, so far as the same relate to his works or manufacturing processes. The sanitary authority shall thereupon allow such person to be heard by himself, agents, and witnesses, and after inquiry, such authority shall determine, having regard to all the considerations to which the Local Government Board are by this section directed to have regard, whether such proceedings as aforesaid shall or shall not be taken; and where any such sanitary authority has taken proceedings under this Act, it shall not be competent to other sanitary authorities to take proceedings under this Act till the party against whom such proceedings are intended shall have failed in reasonable time to carry out the order of any competent court under this Act.

PART IV.

Administration of Law.

7. Every sanitary or other local authority having sewers under their control shall give facilities for enabling manufacturers within their district to carry the liquids proceeding from their factories or manufacturing processes into such sewers:

Provided, that this section shall not extend to compel any sanitary or other local authority to admit into their sewers, any liquid which would prejudicially affect such sewers, or the disposal by sale, application to land, or otherwise, of the sewage matters conveyed along such sewers, or which would from its temperature or otherwise be injurious in a sanitary point of view:

Provided, also, that no sanitary authority shall be required to give such facilities as aforesaid where the sewers of such authority are only sufficient for the requirements of their district, nor where such facilities would interfere with any order of any court of competent jurisdiction respecting the sewage of such authority.

8. Every sanitary authority shall, subject to the restrictions in this Act contained, have power to enforce the provisions of this Act in relation to any stream being within or passing through or by any part of their district, and for that purpose to institute proceedings in respect of any offence against this Act which causes interference with the due flow within their district of any such stream, or the pollution within their district of any such stream, against any other sanitary authority or person, whether such offence is committed within or without the district of the first-named sanitary authority.

Any expenses incurred by a sanitary authority in the execution of this Act shall be payable as if they were expenses properly incurred by that authority in the execution of the Public Health Act, 1875.

Proceedings may also, subject to the restrictions in this Act contained, be instituted in respect of any offence against this Act by any person aggrieved by the commission of such offence.

9. The Conservancy Board constituted under the Lee Conservancy Act, 1868, shall, within the area of their jurisdiction, have, to the exclusion of any other authority, the powers for enforcing the provisions of this Act which sanitary authorities have under this Act.

The said Conservancy Board may also enforce the provisions of the Lee Conservancy Act, 1868, under the head or division, "Protection of Water," by application to the county court having jurisdiction in the place in which any offence is committed against those provisions; and such court may by summary order require any person to abstain from the commission of any such offence, and the provisions of this Act with respect to summary orders of county courts and appeal therefrom shall apply accordingly.

Legal Proceedings. Saving Clauses. Definitions.

(1.) *Legal Proceedings.*

10. The county court having jurisdiction in the place where any offence against this Act is committed may by summary order require any person to abstain from the commission of such offence, and where such offence consists in default to perform a duty under this Act may require him to perform such duty in manner in the said order specified; the court may insert in any order such conditions as to time or mode of action as it may think just, and may suspend or rescind any order on such undertaking being given or condition being performed as it may think just, and generally may give such directions for carrying into effect any order as to the court seems meet. Previous to granting such order, the court may, if it think fit, remit to skilled parties to report on the "best practicable and available means," and the nature and cost of the works and apparatus required, who shall in all cases take into consideration the reasonableness of the expense involved in their report.

Any person making default in complying with any requirement of an order of a county court made in pursuance of this section shall pay to the person complaining, or such other person as the court may direct, such sum, not exceeding fifty pounds a day for every day during which he is in default, as the court may order; and such penalty shall be enforced in the same manner as any debt adjudged to be due by the court; moreover, if any person so in default persists in disobeying any requirement of any such order for a period of not less than a month, or such other period less than a month as may be prescribed by such order, the court may in addition to any penalty it may impose appoint any person or persons to carry into effect such order, and all expenses incurred by any such person or persons to such amount as may be allowed by the county court shall be deemed to be a debt due from the person in default to the person or persons executing such order, and may be recovered accordingly in the county court.

11. If either party in any proceedings before the county court under this Act feels aggrieved by the decision of the court in point of law, or on the merits, or in respect of the admission or rejection of any evidence, he may appeal from that decision to the High Court of Justice.

The appeal shall be in the form of a special case to be agreed upon by both parties or their attorneys, and, if they cannot agree, to be settled by the judge of the county court upon the application of the parties or their attorneys.

The court of appeal may draw any inferences from the facts stated in the case that a jury might draw from facts stated by witnesses.

Subject to the provisions of this section, all the enactments, rules, and orders relating to proceedings in actions in county courts, and to enforcing judgments in county courts and appeals from decisions of the county court judges and to the conditions of such appeals, and to the power of the superior courts on such appeals, shall apply to all proceedings under this Act, and to an appeal from such action, in the same manner as if such action and appeal related to a matter within the ordinary jurisdiction of the court.

Any plaint entered in a county court under this Act may be removed into the High Court of Justice by leave of any judge of the said High Court, if it appears to such judge desirable in the interests of justice that such case should be tried in the first instance in the High Court of Justice, and not in a county court, and on such terms as to security for and payment of costs, and such other terms (if any) as such judge may think fit.

12. A certificate granted by an inspector of proper qualifications, appointed for the purposes of this Act by the Local Government Board to the effect that the means used for rendering harmless any sewage matter or poisonous, noxious, or polluting solid or liquid matter falling or flowing or carried into any stream, are the best or only practicable and available means under the circumstances of the particular case, shall in all courts and all proceedings under this Act be conclusive evidence of the fact; such certificate shall continue in force for a period to be named therein, not exceeding two years, and at the expiration of that period may be renewed for the like or any less period.

All expenses incurred in or about obtaining a certificate under this section shall be paid by the applicant for the same.

Any person aggrieved by the grant or the withholding of a certificate under this section may appeal to the Local Government Board against the decision of the Inspector; and the Board may either confirm, reverse, or modify his decision, and may make such order as to the party or parties by whom the costs of the appeal are to be borne as to the said Board may appear just.

13. Proceedings shall not be taken under this Act against any person for any offence against the provisions of Parts II. and III. of this Act until the expiration of twelve months after the passing of this Act; nor shall proceedings in any case be taken under this Act for any offence against this Act until the expiration of two months after written notice of the intention to take such proceedings has been given to the offender, nor shall proceedings under this Act be taken for any offence against this Act while other proceedings in relation to such offence are pending.

14. The Local Government Board may make orders as to the costs incurred by them in relation to inquiries instituted by them under this Act, and as to the parties by whom such costs shall be borne; and every such order and every order for the payment of costs made by the said Board under section twelve of this Act may be made a rule of Her Majesty's High Court of Justice.

15. Inspectors of the Local Government Board shall, for the purposes of any inquiry directed by the Board under this Act, have in relation to witnesses and their examination, the production of papers and accounts, and the inspection of places and matters required to be inspected, similar powers to those which the inspectors of the said Board have under the Public Health Act, 1875, for the purposes of that Act.

(2.) *Saving Clauses.*

16. The powers given by this Act shall not be deemed to prejudice or affect any other rights or powers now existing or vested in any person or persons by Act of Parliament, law, or custom, and such other rights or powers may be exercised in the same manner as if this Act had not passed; and nothing in this Act shall legalize any act or default which would but for this Act be deemed to be a nuisance or otherwise contrary to law: Provided, nevertheless, that in any proceedings for enforcing against any person such rights or

powers the court before which such proceedings are pending shall take into consideration any certificate granted to such person under this Act.

17. This Act shall not apply to or affect the lawful exercise of any rights of impounding or diverting water.

18. Nothing in or done under this Act shall extend to interfere with, take away, abridge, or prejudicially affect any right, power, authority, jurisdiction, or privilege given by "The Thames Conservancy Acts, 1857 and 1864," or by "The Thames Navigation Act, 1866," or by the Lee Conservancy Act, 1868, or any Act or Acts extending or amending the said Acts or either of them, or affect any outfall or other works of the Metropolitan Board of Works (although beyond the metropolis) executed under the Metropolis Management Act, 1855, and the Acts amending or extending the same, or take away, abridge, or prejudicially affect any right, power, authority, jurisdiction, or privilege of the Metropolitan Board of Works.

19. Where any local authority, or any urban or rural sanitary authority, has been empowered or required by any Act of Parliament to carry any sewage into the sea, or any tidal water, nothing done by such authority in pursuance of such enactment, shall be deemed to be an offence against this Act.

(3.) *Definitions.*

20. In this Act, if not inconsistent with the context, the following terms have the meanings hereinafter respectively assigned to them; that is to say,—

"Person" includes any body of persons, whether corporate or unincorporate.

"Stream" includes the sea to such extent, and tidal waters to such point, as may, after local inquiry and on sanitary grounds, be determined by the Local Government Board, by order published in the London Gazette. Save as aforesaid, it includes rivers, streams, canals, lakes, and water-courses, other than water-courses at the passing of this Act mainly used as sewers, and emptying directly into the sea, or tidal waters which have not been determined to be streams within the meaning of this Act by such order as aforesaid.

"Solid matter" shall not include particles of matter in suspension in water.

"Polluting" shall not include innocuous discoloration.

"Sanitary authority" means—

In the metropolis, as defined by the Metropolis Management Act, 1855, any local authority acting in the execution of the Nuisance Removal for England Act, 1855, and the Acts amending the same.

Elsewhere in England, any urban or rural sanitary authority acting in the execution of the Public Health Act, 1875.

The "application of the Act" to Scotland and Ireland is omitted here, as consisting chiefly in definitions and explanations, and as being, therefore, irrelevant to our circumstances.

THE DISPOSAL OF SEWAGE.

Irrigation.

Sewage-irrigation has already been in successful operation for a few years at the state asylums for the insane in Augusta, Me., and Concord, N. H., in the latter case by means of pumping; but although the crops have very much increased in value in these places, the sewage has not been disposed of in that systematic way which would be necessary in dealing with larger quantities. In fact, there have been a few complaints on the part of people living near the irrigated land in Concord, but it is said that the difficulties have always been readily obviated.

Experiments in Massachusetts.

Before dealing with sewage on a large scale, however, it is important that we should have more experience to guide us, in regard to some matters which can be decided only by that means. We shall look, therefore, with a great deal of interest for the results of the systems of sewage-irrigation which are now preparing at the new asylum for the insane at Worcester and at the state prison for women at Sherborn. The sewage of the new prison for men in Concord is to be utilized also. In Lenox, Colonel Waring has carried out the system of irrigation by underground pipes, of Mr. Rogers Field of London, including his flush-tanks, the same, indeed, which has been used by Colonel Waring for his own residence in Newport for some years, and which was described on page 334 of the Seventh Report of the State Board of Health.*

The accompanying map of the sewage-farm at Worcester explains itself. There are nearly fourteen acres of land available. The several side-outlets of the main sewer allow of winter-irrigation on plots not used in summer; and during

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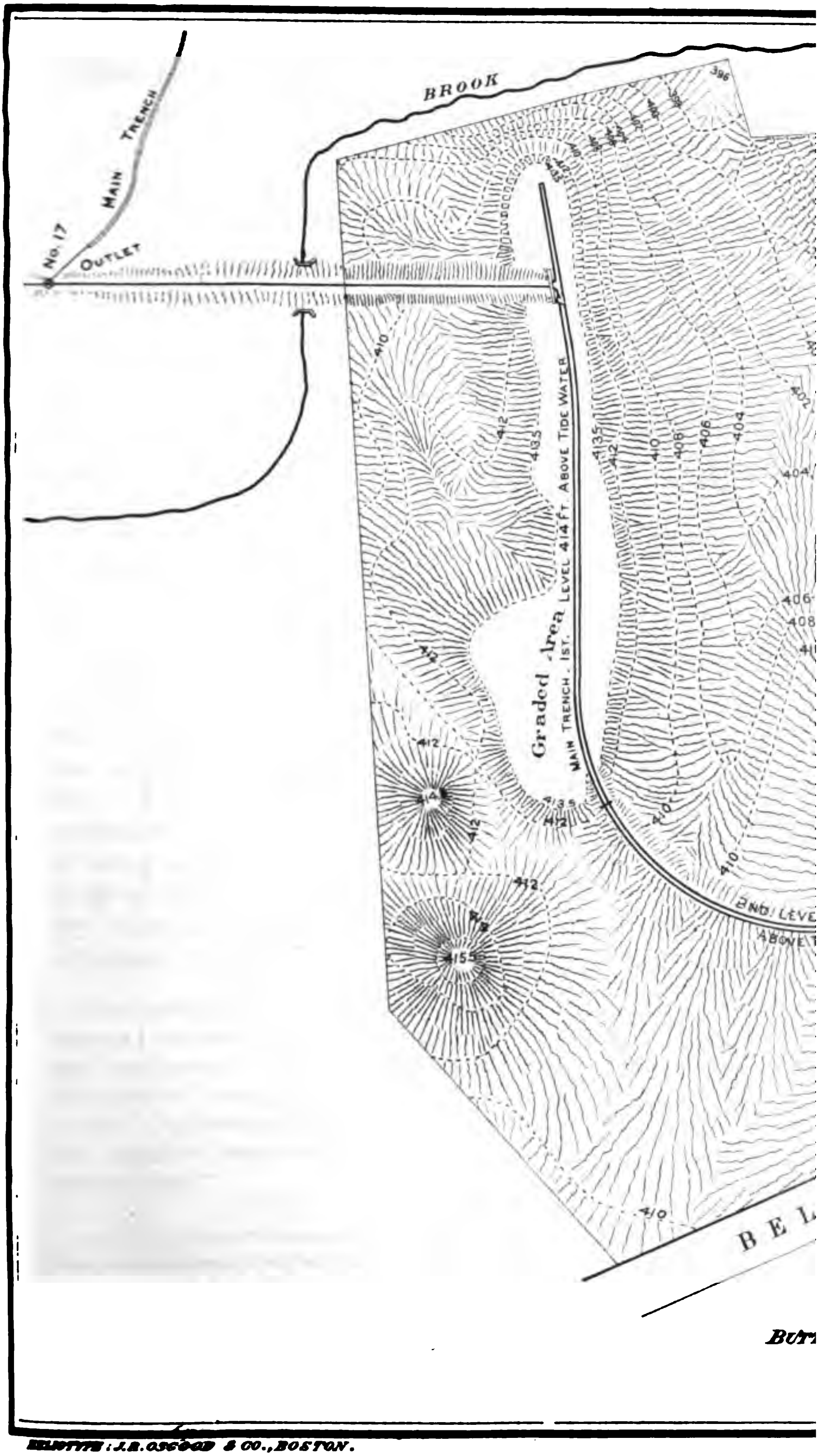
* Mr. J. Netten Radcliffe's statement that these should be cleaned once a year was there inadvertently given as Colonel Waring's, who, on the contrary, thinks that such frequent cleansing is not necessary.



HELIOTYPE: J.R. OSGOOD & CO., BOSTON.

wet weather, or when for any reason the sewage is not required for the growing crops, it may be passed on to several acres of growing grass at the various points where there are side-outlets.* The farm of the asylum consists of 275 acres.

Progress Elsewhere.

In other countries, some valuable experience and information have been got during the year, and brief reference will be made here to such as have some important bearing on our subject, although they, in the main, simply confirm the statements which were made in the previous report.

Glasgow.

The last report on the sewerage of Glasgow † recommends a main drainage-scheme similar to that advised by Bateman and Bazalgette in 1868, but to follow the valley of the Clyde and discharge at the mouth of the river, twenty-three miles below the city, instead of passing twenty-seven miles southwest, to a point on the coast, and using the sewage in irrigation on eleven thousand acres of land, as was proposed in 1868. The various dry-earth systems, on so vast a scale, were condemned, as inferior to water-carriage. All the processes of sewage-utilization were declared more costly than discharging into a large body of water, and no more satisfactory from a sanitary point of view. Of the best method, irrigation, it is stated that—

> "The cost of the distribution of sewage over the land would not increase in direct proportion to the area irrigated, but at a greater rate; nor have we any experience of how far the nuisance of a large area of many thousand acres, irrigated with sewage, would extend. On these grounds, it is not safe to argue from small irrigation farms to large ones, either from an economical or a sanitary point of view."

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* Only one of these, that nearest to the sewage-farm, is represented on the map. There are six others between that point and the asylum.

† Report of Sir John Hawkshaw, the commissioner appointed to inquire as to the purification of the River Clyde, Edinburgh, 1876.

The Liernur System.

The difficulty of finding a suitable outlet for the water-carriage system, and of disposing of the sewage at all outlets, unless in deep water, has induced one of the first authorities in England* to recommend the Liernur system for trial in some parts of towns, although he says "it is probable that those in wealthy or in easy circumstances will not abandon willingly their water-closets, even if they be subject to a tax for them," and "the nicety of the present siphon-pans and water-closets will have to be surrendered, and undoubtedly dirty rain-water, at times, and much dirty waste-water from houses daily, must run into adjacent water-courses."

The Master of Public Works has advised that this system be extended in the upper parts of Amsterdam, where about one-fiftieth of the city is already supplied with it, and that dry removal be adopted in the lower quarters.

Precipitating Processes.

When the last report of the State Board of Health was published, the precipitating processes at Coventry and Leeds seemed to be the best of those then in use.

Coventry.

With regard to Coventry, it has been impossible to ascertain anything definite as to the cost of the "manure" made; and the same company have been placed under chancery injunction for their works at Nuneaton, because of the nuisance created there from insufficient cleansing of the sewage.

> "Two manufacturers at Kenilworth (one a tanner discharging 5,000 gallons, and the other a fellmonger discharging 50,000 gallons, of refuse daily into the Finham Brook, which, like the Sherbourne, is one of the tributaries of the River Avon) have taken a license of this company, and are now erecting the necessary works to purify, at their own expense, their refuse by the same processes as are used at Coventry. The cost of purifying the tanner's refuse will be about 10*d*., and that of the fellmonger's about 2*s*. 6*d*. per day."

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* Report on Captain Liernur's System of Sewerage, by William Haywood, Engineer and Surveyor to the Commissioners of Sewers of London, 1876.

Leeds.[*]

With regard to Leeds, the chairman of the Native Guano Company has published an account,[†] which would of course put the matter in the best light possible.

He gives the results of Dr. Letheby's examinations of the effluents made September, 1875, and January, 1876, and shows that they came within the standards demanded by the Rivers Pollution Commission and Thames Conservancy Board, at those times, when of course they were taking care to make the best effluent possible.

Table XIV.—*Examination of Effluent Water of the A B C Precipitating Process, at Leeds.*

[Results given in Parts per 100,000.]

	Dr. Letheby's Analysis of Effluent from Leeds Sewage.		Standard Demanded by the—	
	September, 1875.‡	January, 1876.	Rivers Pollution Commiss'n.	Thames Conserva'cy Board.
In Solution.				
Actual ammonia,	1.47	1.75	–	–
Albuminoid ammonia,	0.20	0.14	0.30	1.00
Total nitrogen as ammonia,	1.91	1.90	–	–
Chloride of sodium,	16.85	15.85	–	–
Mineral matter,	77.99	68.68	–	–
Organic matter,	6.56	9.01	–	–
Total solids in solution,	84.55	77.69	–	140.00
Organic carbon (estimated),	1.31	1.80	2.00	2.80
In Suspension.				
Mineral matter,	0.31	1.37	3.00	–
Organic matter,	0.45	0.71	1.00	–
Total solids in suspension,	0.76	2.08	4.00	7.00

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[*] By some unaccountable error, probably in copying, the precipitating tanks at Leeds were described in the last report (p. 349) as being of iron and six in number; whereas they are stone-faced, and consist of *two sets* of six each, with a double channel between them. The *cisterns* into which the sewage passes before entering the tanks are of iron.

[†] Report on Recent Trials of the A B C Process, made by the Leeds Corporation; by William Crookes, F. R. S. London, 1876.

[‡] Samples for examination were taken every two hours for two weeks. Dr. Letheby's analyses were calculated in grains per gallon, but they are given here in this way for the sake of uniformity with the other tables.

Leeds Effluent Compared with Others.

Mr. Crookes says:—

"In Dr. Letheby's report, he speaks of the effluent water having an offensive smell. This is not unlikely, considering that it had been kept closely stoppered for a week or more."

Sir John Hawkshaw says, too, in the report just quoted:—

"The effluent water at Leeds is not by any means pure, but might be rendered so by a larger expenditure in deodorizing substances and precipitants, and by an outlay on filter-beds."

This effluent would be pure enough in many cases, but is far below the standard which may be got in irrigation, as may be seen by the following extract from recognized authorities:—*

"At Croydon, the purification of the sewage of that town, by passing over grass-lands in the immediate neighborhood, has been so successful that people residing close up to the sewage-irrigated land do not complain of any nuisance; and so entirely devoid of color, smell or taste is the sewage after having passed over the ground, that on comparing a bottle of it with a bottle of water from Loch Katrine, without knowing in which bottle the respective waters were contained, one of us actually selected the Croydon sewage water as being that which he believed was Loch Katrine water.† Similar results have attended its application at Rugby, Carlisle, Barking, and other places, and there can therefore be no doubt whatever that foul sewage after being properly and sufficiently passed over suitable land, and applied to suitable crops, may be wholly deprived of its offensive character."

Present Methods in Leeds.

The authorities of Leeds advertised some years ago, on the failure of the Native Guano Company, for proposals to deal with their sewage, and got answers from ten individuals or companies; of which the Clarifying and Utilization of Sewage Company, now at work in Leeds, represents one, Goodall's process (modified A B C).

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* Report on the Sewerage of Glasgow, 1868. By J. F. Bateman and J. W. Bazalgette, p. 22.

† Dr. Carpenter kept a bottle of this water for a year without any change taking place in it.

The chairman of the Utilization of Sewage Committee of Leeds expressed himself as follows in regard to the present works, under date of February 29, 1876:—

> "The sludge has not yet been converted by us into a salable manure, but four drying cylinders are just ready for use and will at once be set to work; it remains to be proved whether the sale of the manure will pay for the expenses incurred in the manufacture, but, from replies received from many farmers and gardeners who have used some manufactured at the experimental works, it appears to be well suited for grass-land, garden-produce, plants and flowers. Up to the present time we know of no system more likely to answer our requirements."

Hille's Process.

Hille's process (chloride of magnesium and lime) has lately been introduced in Edmonton (population 15,000) and Tottenham (population 23,500), followed by filtration, and is said to have been very successful. Capt. L. Flower, C. E., of the Lee Conservancy Board, says of it:—

> "An effluent sufficiently pure for sanitary purposes is now discharged; there is also an absence of nuisance at the works such as I have not met with elsewhere. . . . The lime process and its residue were abominations. The Whitthread process, apart from the smell of the sludge and the cost, was an improvement."

The works at Tottenham, formerly used for the Whitthread process, are thus described* by William Shelford, M. Inst. C. E. His diagram of the tanks, etc., is also given (page 86), as being one of the simplest and best in use for the precipitating process:—

> "The sewage was pumped up into the precipitating tanks at the rate of about one and a quarter million gallons per day, and a 'salmon-ladder' mixer . . . was placed between the pump and the tanks, through which the sewage flowed by gravitation at a velocity sufficient to prevent the subsidence of the chemicals, and with a disturbance enough to incorporate them thoroughly (inclination 1 : 28). The phosphate was added to the sewage at the top of the ladder, and the lime at any suitable point in its length. . . . The filters were constructed in the cheapest possible manner by

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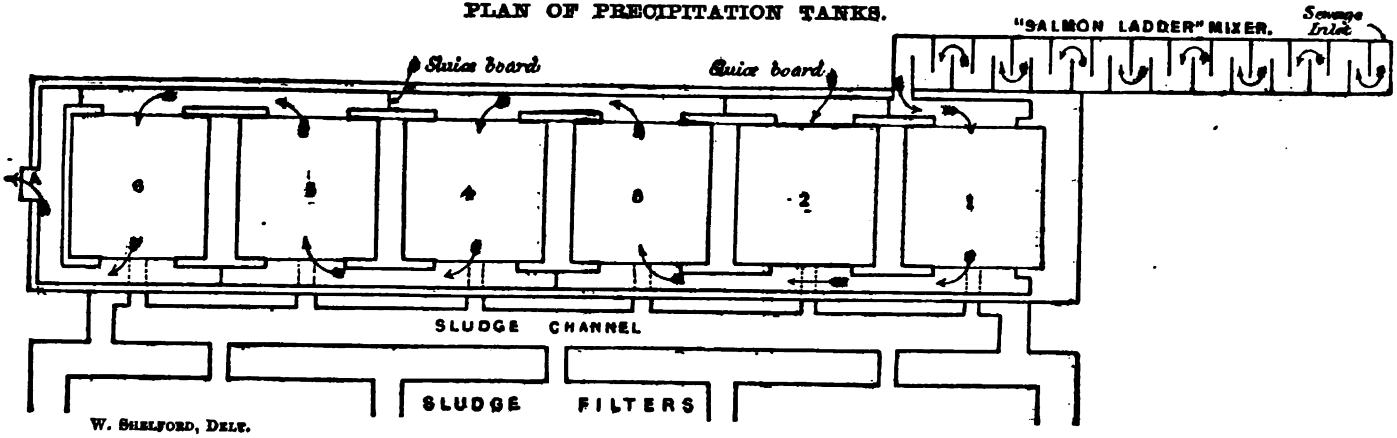
* Proceedings of the Institution of Civil Engineers, Vol. XLV. London, 1876.

MODEL WORKS AT WANDSWORTH ROAD.

PLAN OF PRECIPITATION TANKS.



W. Shelford, Delt.

A — Outlet of effluent water.

Note. — Tanks Nos. 1 and 2 are worked alternately.

forming the ground and draining its surface with agricultural drain-pipes, surrounding the whole with a small earthen bank two feet high and dividing the area into convenient apartments. The space was then filled with screened ashes to a minimum depth of one foot, and the sludge was run upon the top to a depth of about twelve inches. These filters were never constructed of a sufficient extent (to do which and roof them was estimated to cost £1,000), but their working was quite satisfactory."

The sludge, containing about ninety per cent. of water, was thus reduced so as to contain from sixty-five to seventy-five per cent., and was completely dried by artificial heat; but the smell from the chimneys necessitated the works being given up.

Sewage Precipitates Generally.

Mr. Robert Rawlinson, C. B., of the Local Government Board, and one of the First Rivers Pollution Commission, said of the sewage precipitates, before the Society of Arts Conference, May, 1876:—

> "Whatever the value of the manure might be, it did not find a ready sale. When he was at Rochdale, he saw thousands of tons which the farmers would not take away. It was evident, therefore, that whatever the value might be, at the present time the price asked did not offer sufficient inducement for farmers to buy it."

Dry Removal.

Many towns in England, with all the difficulties of sewage-disposal staring them in the face, have adopted various systems of dry removal, which also have their objections. At Rochdale* and at Manchester,* the most satisfactory methods are used. In Rochdale, the ash-carts pour their contents into the hopper of a sifting-machine, which separates the fine ash, fine cinder, rough cinder, vegetable matter, glass, pots, and rags. The disposal of this refuse is by using the fine ash for manure, the fine and rough cinder for fuel for the steam-boilers and for sale; the vegetable matter is burnt, and the ash from it ground and added to the manure, for the sake of the potash; the clinkers and pots are ground up for mortar and cement, and the rags, glass, and iron sold. Thus the whole of the refuse collected is utilized and the nuisance of a tip obviated. In Manchester (population, 351,189; mortality,

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* See pages 182, 183, and 184 of the Seventh Report of the State Board of Health.

28.4), about 20,000 tub-closets and 23,000 middens are in use; that there is a difference of opinion as to their efficacy, may be seen from the statement of Mr. Lewis Angell, C. E., Borough Engineer at East London, that anything more disgusting and unclean than the pail-system, as carried out at Manchester, he had never seen; but certainly this might be avoided with sufficient care.

Opinions of Experts.

The most important contribution to our knowledge on the disposition of sewage, during the year, has been from a conference of the leading sanitarians and engineers of England, under the auspices of the Society of Arts, held in London, May 9, 10, and 11, 1876, at which there were full reports and discussions on all branches of the subject. Very full returns were got from one hundred and sixty towns; of which twelve disposed of their sewage by direct irrigation, twenty-two by irrigation after treatment (subsidence of solid parts), three by subsidence, thirteen by filtration, seven by precipitation and filtration, nine by precipitation, eighty-one by discharge into streams, and in nineteen, cesspools and dry vaults were used instead of sewers. The results arrived at are embodied in the following report:—

"The chairman of the conference and the executive committee, after having carefully considered the information furnished from the various localities, as well as the facts brought forward during the conference, have to submit the following as the conclusions to which such information appears to lead:—

"1. In certain localities, where land at a reasonable price can be procured, with favorable natural gradients, with soil of a suitable quality, and in sufficient quantity, a sewage farm, if properly conducted, is apparently the best method of disposing of water-carried sewage. It is essential, however, to bear in mind that a profit should not be looked for by the locality establishing the sewage farm, and only a moderate one by the farmer.

"2. With regard to the various processes based upon subsidence, precipitation, or filtration, it is evident that by some of them a sufficiently purified effluent can be produced for discharge, without injurious result, *into water-courses and rivers of sufficient magnitude for its considerable dilution;** and that for many towns, where land is not readily obtained at a moderate price, those particular processes afford the most suitable means of disposing of water-carried sewage. It appears, further, that the sludge, in a manurial point of view, is of low and uncertain commercial value; that the cost of its conversion into a valuable manure will preclude the attainment of any adequate return on the outlay and working expenses connected therewith, and that means must therefore be used for getting rid of it without reference to possible profit.

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* The italics are mine.—[Ed.

"3. In towns where a water-carried system is employed, a rapid flow, thorough ventilation, a proper connection of the house drains and pipes with the sewers, and their arrangement and maintenance in an efficient condition, are absolutely essential as regards health; hitherto sufficient precautions have rarely been taken for efficiently insuring all the foregoing conditions.

"4. With regard to the various dry systems, where collection at short intervals is properly carried out, the result appears to be satisfactory; but no really profitable application of any of them appears as yet to have been accomplished.

"5. The old midden or privy system, in populous districts, should be discontinued, and prohibited by law.

"6. Sufficient information was not brought forward at the conference to enable the committee to express an opinion in regard to any of the foreign systems.

"7. It was conclusively shown that no one system for disposing of sewage could be adopted for universal use; that different localities require different methods, to suit their special peculiarities, and also that, as a rule, no profit can be derived at present from sewage utilization.

"8. For health's sake, without consideration of commercial profit, sewage and excreta must be got rid of at any cost.

"The executive committee, whilst abstaining from submitting any extensive measures, have no hesitation in recommending that the prevention of dangerous effects from sewage gases should receive the immediate attention of the Legislature, and they submit the following resolutions as the basis of petitions to Parliament:—

"1. That the protection of public health from typhoid and other diseases, demands that an amending Act of Parliament be passed, as soon as possible, to secure that all house drains connected with public sewers in the metropolis, and towns having an urban authority, should be placed under the inspection and control of local sanitary authorities, who shall be bound to see to the effective construction and due maintenance of all such house drains, pipes, and connections. Provisions having this object in view already exist in the Act constituting the Commissioners of Sewers in the City of

London, in the Metropolis Local Management Act, 1855, and in the Public Health Act, 1875, but practically they seem scarcely sufficient for the purpose.

"2. That plans of such drains and connections be deposited in the charge of the respective local authorities, who shall be bound to exhibit them and supply copies of them to the public on payment of a moderate fee.

"3. That the owners of houses be compelled by law to send to the respective local authorities, within a specified time after the passing of the Act, plans of all house drains on an appointed scale.

"(Signed by) The Right Hon. JAMES STANSFELD, M. P.,
"*Chairman of the Conference.*

"Lord ALFRED S. CHURCHILL, Chairman of the Council,
"F. A. ABEL, F. R. S. President of the Chemical Society,
"Sir HENRY COLE, K. C. B.,
"Capt. DOUGLAS GALTON, R. E., C. B., F. R. S.,
"Lt.-Col. E. F. DU CANE, R. E., C. B., Sur.-Gen. of Prisons,
"*Members of the Executive Committee.*"

ENGLISH GOVERNMENT STATISTICS.

In March, 1876, very valuable statistics* were published by the Local Government Board of England, giving, as nearly as possible, the present state of the sewage question in that country. A large number of the 462 towns, for which the facts are stated, still use cesspools and vaults; the majority cast their sewage into some neighboring body of water. Where there are sewers, and there is, therefore, sewage to be disposed of, it is not in all cases stated for what part of the town sewers are built, and we cannot always judge from the population how much sewage is disposed of in each way.

Overflow of Sewage on Land.

This is the simplest way; *i. e.*, letting the sewage run over grass-land to be taken wholly or in part by farmers, an imperfect method, but good enough in certain places. This is used by thirteen towns having populations from 5,115 to 7,500. It costs nothing usually, and there is also no profit to the town. Of course there are no works to be built, if the flow is by gravitation. One town only of the thirteen reported any expense incurred for their last year (£54), possibly from pumping.

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* Return pursuant to an order of the House of Lords, dated July 20, 1875, from every urban sanitary district in England and Wales having more than 5,000 inhabitants. London, 1876.

Filtration.

Filtration through gravel-land, prepared beds of cinders, etc., is in use in sixteen towns. The original works in ten are not stated as costing anything. There was an amount expended during the year in nine cases of twenty, twenty-three, twenty-five, fifty-two, sixty, seventy-seven, eighty-four, one hundred and thirty-seven, and one hundred and fifty pounds sterling respectively, and in the rest, nothing. In three cases there were figures under the column of profits; in one of twenty-five pounds (cost, one hundred and thirty-seven pounds), but it is stated that this was the amount received, and not the profit; in a second, of sixteen pounds (cost, twenty-five pounds), but it is stated elsewhere that this is the amount received simply; and in a third, of six pounds, in regard to which there is no statement; but the inference is that this also is simply the amount received, and presumably was from sludge sold. Of the sixteen towns,—

One had a population of 25,000.
Two had populations from 20,000 to 25,000.
Three had populations from 10,000 to 20,000.
Five had populations from 7,000 to 10,000.
Five had populations from 5,000 to 6,000.

Simple Subsidence.

The sewage of ten towns is disposed of in this way. One has a population of 43,000, and uses only partial subsidence; one has a population of 14,000; three from 9,000 to 10,000; and five, 7,000 and under. In only two is any expense reported for the year's work. In none was there any profit. Of course this method is very incomplete, and is satisfactory only when the works are on a small scale, remote from dwellings, and not required to accomplish more than a very partial cleansing of the sewage.

Subsidence and Filtration.

This is simply a modification of the last process. O course only the rudest basins for precipitating are used, an the land is depended on for filtration. One only reported an original cost for their works (population, 14,000; cost, £391) the others have less than 7,500 inhabitants each. In none wa there any profit; in two, small expenditures were reported.

Irrigation.

Forty-six towns irrigate with their sewage; of these, seve use subsidence-tanks for removing the heavier parts of th solids, and with the results shown in the following table.

In the next six tables, in nearly every case, the dura tion of the time is given of the process in use; in the fourt column, the cost of sewers is not included; in the fifth colum there is some difficulty in getting at the exact results, inasmuc as it is not always stated whether the interest on the origina outlay is included, nor how much of the money was expende on permanent works; in the last column, the amount place under the head of profit has, in some cases, been found, fro other sources, to mean simply the receipts. The results ar supposed to be, in most cases, for the year 1874. It will b noticed that the profits are often said to be *nil*, without an indication of the amount of the loss, if there was any.

TABLE XV.—*Results of Irrigation (with Subsidence-Tanks)—Seve Towns.*

URBAN SANITARY AUTHORITY.	Population.	The length of time during which any systems of artificial sewage treatment have been in operation.	The total amount which has been expended for the artificial treatment of sewage.	The cost of carrying on such sewage works during the last year for which accounts have been made.	The profit, if any, derived from these works, during the same
Banbury, .	11,718	Since 1874, .	£5,500	£590	£109
Blackburn, .	90,000	3 years, . .	88,750[2]	7,007	1,226
Brynmawr, .	7,000	9 years, . .	300	Nil.	Nil.
Epsom, . .	6,276	4 years, . .	3,626	244	Nil.
Northampton,	50,000	Since Jan.'71,	70,360[2]	[3]	1,922
Penrith, . .	8,317	– –	[5]	–	–
Wrexham, .	8,537	4 years, . .	1,000[6]	Nil.	Nil.

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[1] Loss. [2] Including land. [3] Not stated. [4] Return from sales of crop

[5] Taken by a private individual at his own cost. [6] Let to a private individua

By the Society of Arts Conference, the following results are given: Banbury, expenses in 1875, not including interest on capital, £513; receipts from sale of crops, £1,450; for deposit in tanks, £30. Blackburn, average annual outlay, £768. Northampton, net cost of dealing with sewage, about £2,300 in 1875, including interest on works, probably.

TABLE XVI.—*Irrigation (with previous precipitating treatment)—Six Towns.*

URBAN SANITARY AUTHORITY.	Population.	The length of time during which any systems of artificial sewage treatment have been in operation.	The total amount which has been expended for the artificial treatment of sewage.	The cost of carrying on such sewage works during the last year for which accounts have been made.	The profit, if any, derived from these works, during the same period.
Bolton, . . .	90,000	1⅞ years, . .	£16,578[2]	£1,306	£1,007[3]
Chester,[4] . . .	35,232	Since July,'75,	4,200	–	Nil.
Edmonton, . .	15,000	4 months, .	1,929	[1]75[5]	Nil.
Harrow, . . .	5,010	6 years, . .	4,324	[1]24	Nil.
Tunbridge, . .	9,000	3 years, . .	3,500	208	Nil.
Watford, . . .	8,111	4 years, . .	1,400	613	436[6]

TABLE XVII.—*Irrigation (the farms being leased to private individuals)—Seven Towns.*

Enfield, . . .	17,000	– –	[8]	–	–
Guisbrough, . .	5,202	5 years, . .	£1,552[9]	[9]	£5[10]
Leamington,[7] . .	20,917	Since 1872, .	16,000	£1,035	585[11]
Leek (in part), .	11,732	– –	Nil.	Nil.	Nil.
Ormkirk, . .	6,127	– –	–	Nil.	Nil.
Romford, . .	6,335	– –	Nil.	Nil	Nil.
Worthing, . .	9,000	12 years, . .	[12]	–	10[13]

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[1] In these two cases, it is probably the net cost that is given, and not the outlay.

[2] Works, £11,018; land, £5,560. [3] Loss. [4] A part of the sewage only is used.

[5] Per year, estimated. [6] Produce of farm.

[7] The Earl of Warwick pays £450 a year for the sewage, on a thirty years' lease; the town loses a little less than the cost of pumping the sewage, each year.

[8] Expenses paid for use of sewage. [9] Paid by lessee. [10] Rent paid town.

[11] Loss. [12] Company builds necessary works. [13] Per year.

TABLE XVIII.—*Simple Irrigation (the farms being carried on b the various towns)—Twenty-six Towns.*

URBAN SANITARY AUTHOTRIY.	Population.	The length of time during which any systems of artificial sewage treatment have been in operation.	The total amount which has been expended for the artificial treatment of sewage.	The cost of carrying on such sewage works during the last year for which accounts have been made.	The profit, if any, derived from these works, during the same period.
Altrincham,[1] . .	8,478	5 years, . .	£3,000	£134	Nil.
Bedford, . . .	16,851	7 years, . .	6,997	2,627	£180
Bishops Stortford, .	6,250	3 to 4 years, .	7,728	575	Nil.
Bury St. Edmunds,	14,928	8 years, . .	1,930	336	Nil.
Chelmsford, . .	9,500	Since 1866, .	2,300	250 to 300	Nil.
Chorley, . . .	18,000	6 years, . .	16,550[2]	906	58
Crewe, . . .	20,000	2 years, . .	42,550[2]	5,368[4]	
Croydon, . .	55,652	18 years, . .	21,740	11,947[6]	Nil
Doncaster, . .	18,750	3 years, . .	20,000	332	170
Gateshead,[7] . .	48,627	– –	–	–	–
Harrogate, . .	6,655	5 years, . .	11,050	582	40
Kidderminster, .	19,463	3 years, . .	44,041	921	Nil.
Maidenhead, . .	6,173	5 years, . .	–	516	53
Norwich,[1] . .	84,000	2 years, . .	113,000	4,224	Nil.
Prescot, . . .	5,990	2 years, . .	8,268	94	28
Reigate, . . .	15,910	4 years, . .	3,463	440	128
Rugby, . . .	8,500	20 years, . .	5,800	344	85
Swindon New Town,	7,628	4 years, . .	14,434	1,662	Nil.
Tunbridge Wells, .	19,410	3 years, . .	87,243	8,199	528
Tyldesley and Shakerley,[8] . .	8,400	– –	Nil.	Nil.	Nil.
Ware, . . .	5,362	– –	578	690	Nil.
Warwick, . .	11,002	8 years, . .	11.000	2,067[9]	996
Wellington, . .	6,283	– –	Nil.	Nil.	Nil.
West Derby, . .	31,000	3 years, . .	58,147	2,545	803
Wolverhampton, .	71,500	– –	38,000	4,451	646

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[1] Only part of the sewage is used.

[2] Including land.

[3] Loss.

[4] Including interest.

[5] This may mean only the receipts, and not the profits. Wolverhampton is returne as also filtering their sewage, although it is not known to the writer whether th means the separation of solids before irrigation, or whether it is part of the proces of irrigation itself as the sewage passes through the soil.

[6] Including repairs, fences, etc.

[7] The sewage of only 1,000 inhabitants is use

[8] The sewage is disposed of to private parties.

[9] The cost of pumping alone was £671.

[10] By the "Pall Mall Budget" of November 10, 1876, it is stated that the loss in 18 was £3,919, and that it will be about £4,000 for 1876. These sums probably inclu interest on the capital invested, which, including cost of injunctions, etc., is stated t have been £70,000.

By the Society of Arts Conference, the net cost at Chelmsford was about £300, and the receipts £35; at Croydon, the net cost was £2,367 a year, but they pay enormous rents for their land, which is in the "Outer Ring" of London; at Reigate, there was a loss of £104 in 1875, and at Altrincham there was some loss. At Eton, on the other hand, a village of 3,500 inhabitants, including the school, there was a profit of £120; but it is sewered on the separate system, keeping out rain-water, so that the sewage is quite concentrated.

Intermittent Downward Filtration.[*]

This system is comparatively a new one, and has not yet been generally introduced, although several towns are now, since the return, beginning to go to work on that principle.

TABLE XIX.—*Intermittent Downward Filtration—Three Towns.*

URBAN SANITARY AUTHORITY.	Population.	The length of time during which any systems of artificial sewage treatment have been in operation.	The total amount which has been expended for the artificial treatment of sewage.	The cost of carrying on such sewage works during the last year for which accounts have been made.	The profit, if any, derived from these works, during the same period.
Kendal, . . .	13,500	1½ years, . .	£18,871	£110	£385[1]
Merthyr Tydfil,[2] .	55,000	4 years, . .	53,330	2,690	1,067[3]
Wellingborough,[4] .	12,000	3 years, . .	–	15	Nil.

[1] It is thought that this must mean receipts, which amounted to £150 the first season.

[2] Twenty-five acres only are used for the intermittent downward system; a couple of hundred acres have been added for ordinary irrigation, and the preparation of that land may have been the cause of the high figures in the fifth and sixth columns.

[3] Loss.

[4] The farm is for only one-tenth of the population.

Precipitation.

Twenty-six towns precipitate their sewage, one-half of them filtering also.

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[*] This is essentially the same as the *oxydation par colmatage,* which has been successfully applied near Paris by Gérardin in the case of several manufactories, and which has sufficiently purified the River Croult, previously very much contaminated.

TABLE XX.—*Chemical Processes Alone—Thirteen Towns.*

URBAN SANITARY AUTHORITY.	Population.	PROCESS IN USE.	The length of time during which any systems of artificial sewage treatment have been in operation.	The total amount which has been expended for the artificial treatment of sewage.	The cost of carrying on such sewage works during the last year for which accounts have been made.	The profit, if any, derived from these works, during the same period.
Accrington,	21,788	McDougall's disinfectant,	– –	–	£813	Nil.
Birmingham,	366,325	Lime,	– –	£100,800	31,994	£1,325[1]
Burton-upon-Trent,	20,378	Lime,	New,	7,121	1,279	–
Coventry,	37,700	General Sewage and Manure Co.,	2 years,	[2]	[2]	[2]
Hertford,	7,169	Lime,	16 years,	3,500	400	Nil.
	–	Phosphate,	1 year,	2,000	[2]	[2]
Hitchin,	8,000	Liming,	– –	–	129	Nil.
Leeds,	285,000	A B C,	– –	57,000	15,000[3]	Nil.
Leicester,	108,000	Lime,	20 years,	30,000	2,116	83
Luton,	17,316	Lime,	18 years,	7,000	600	592[1]
Nuneaton,	7,392	General Sewage and Manure Co.,	Since 1872,	–	–	–
Stroud,	8,001	Bird's process,	18 years,	79	100	Nil.
Tottenham,	27,000	Whitthread process,	– –	11,000[4]	1,979	65
Waltham Holy Cross,	5,197	Lime,	2 years,	3,850	–	Nil.

We learn from the conference referred to that the net cost of dealing with the sewage in Leicester was £2,032,—so near £2,116—£83, as given in Table XX., that the difference may be accounted for by the fact that shillings and pence are not reckoned.* The figures of "profit" in the sixth column must, therefore, signify receipts only. In Birmingham, the net cost for one year was given as £12,710, which corresponds with the previous accounts of that city.† For Tottenham, the net annual cost for four years was £2,000 per annum, so that the profit of £65 is supposed to be to the credit of the town, while the great loss was probably on the persons who managed the sewage (Whitthread Company), for Mr. Shelford says,‡ writing at a later date,—

> "It is unfortunate that the company was compelled by financial difficulties to hand over the works to the local board; and that, partly owing to the doubt entertained as to the power of a local board to trade in the manufacture of manure, the Whitthread process has been for the present abandoned."

Precipitation and Filtration.

Of the thirteen towns dealing with their sewage in this way, eleven return profits of "nil," and two losses of £25 and £400 respectively. One township reports the sewage as being disposed of in its different villages by subsidence, filtration, and irrigation.

Cost of Precipitation.

It is difficult to get at the cost of the precipitating processes exactly, because, where they are on a large scale and well carried out, they are generally in the hands of private companies. Mr. William Shelford, however, who was formerly engineer of the Native Guano Company (A B C), during their experiments with the sewage of London at Crossness, has published some important statistics on the subject.§ He says that the cost of precipitating the sludge and drying it enough for transportation, is thirty shillings a ton, and that anything over that sum is due to the chemicals, which may be cheap or expensive, sparingly used or in sufficient quantity. His opinion is, "In short, the success of precipitation depends on neutralizing the cost of the chemicals employed, or, in other words, upon the admixture of precipitants which have a manurial value, and upon the eventual recovery of that value in the dry manure." He has tabulated the results of various experiments thus :—

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* And yet "outlying villages object to contamination of the river by effluent sewage water."

† Seventh Report of the State Board of Health, page 351.

‡ Op. cit.

§ "The Treatment of Sewage by Precipitation." Proceedings of the Institution of Civil Engineers, Vol. XLV. London, 1875.

TABLE XXI.—*Results of Experiments in Precipitating Sewage in Large Quantities.*

PROCESS.	PLACE.	Dose per 1,000 gallons.	Cost of Manure per ton.		
		lbs.	£	s.	d.
A B C, . .	Crossness, London Outlet, .	31.80	5	16	4
A B C, . .	Leamington, ...	1.86	1	17	1
Campbell, . .	Tottenham, ...	9.76	4	0	9
Whitthread, .	Tottenham, ...	2.00	3	3	0

Cost of Irrigation.

Irrigation, when well managed and not on too large a scale, seems likely to give very good results from a financial point of view, if no excessive sums are paid for expensive land, pumping, etc.; but, like precipitation, in the majority of cases, there is a loss somewhere, if it is done well enough to be satisfactory. Its advocates, however, are gaining rather than losing confidence from their increased experience. Colonel Jones has been especially successful at Wrexham, where, according to Mr. Eyton Jones, mayor of the town, "they have eighty-four acres at £5 an acre, which they sublet to Colonel Jones, who paid them a profit rent of £30 a year, and yet he made £300 a year profit by it, besides setting aside a sinking fund annually to recoup himself on his capital account."

Colonel Jones, too, has recently offered to take a lease of the West Derby Farm (two hundred acres, with sewage from a population of about 20,000) at the usual rent of adjoining land, proposing to occupy his spare time in superintending this new farm, in addition to the one which he has now got into pretty regular working order at Wrexham, although the two places are separated by about thirty miles of railway.

The Earl of Dudley has offered to take the sewage of Dudley, building at his own cost the necessary works, thereby, according to the "Pall Mall Budget" of October 6, 1876, saving the town an immediate outlay of £50,000.

The Earl of Warwick's farm at Leamington is said to be satisfactory to him, but no accounts are published of the pecuniary result.

Cost of Barking Farm.

The farm at Barking, with an area of two hundred and twelve acres, where a small part of the sewage of London was utilized as an experiment, gives the following as the results of six years' experience:—

	Profit.			Loss.		
	£	s.	d.	£	s.	d.
Year ending August 31, 1870, . . .	619	4	1			
31, 1871, . . .	1,324	11	6			
Sixteen months ending December 31, 1872,				90	11	5
Year ending December 31, 1873, . .				443	2	3
31, 1874, . .				256	1	0
31, 1875, . .				292	7	0

"The years ending August 31, 1870 and 1871, were favorable to sewage, being without rain. The land was new to sewage, and we were also selling milk, which is, perhaps, the most profitable method of turning sewage to account. The average cost of pumping the sewage to a height varying from about thirty-five to forty feet, through a main rather over one and a half miles in length, is about £450 per annum, without allowing anything for depreciation in machinery, etc. This is not included in the lists of payments," and, therefore, is not reckoned in the account.

Cost of Cheltenham Farm.

The accounts of Cheltenham (population, 41,923) show a very fair result to the town from leasing the sewage-irrigated land (two hundred acres) to farmers; but, unfortunately, only "a fair effluent has been obtained," as the less intent on profitable farming rather than purifying s Subsidence tanks are used, from which there must be stench; and the authorities seem to have excellent suc selling the sludge mixed with ashes, at two shillings pe yard, from which part of the process there was an a annual profit of £52 15*s*. 9*d*. for the five years.

Cheltenham Sewage Farm—Balance Sheet.

Receipts.	£	s.	d.	Payments.	£
1871.					
				Wages, tradesmen's bills,	
Rents, ...	899	12	0	and other expenses, .	28
Fluid sewage, . .	75	10	0	Rates and taxes, . .	2
Deficiency, . . .	134	15	0	Interest on loan, . .	79
	£1,109	17	0		£1,10
1872.					
				Wages, tradesmen's bills,	
Rents, ...	868	15	10	and other expenses, .	28
Fluid sewage, . .	142	0	0	Rates and taxes, . .	2
Deficiency, . . .	80	11	5	Interest on loan, . .	78
	£1,091	7	3		£1,09
1873.					
				Wages, tradesmen's bills,	
Rents, etc., . . .	936	19	6	and other expenses, .	28
Fluid sewage, . .	131	10	0	Rates and taxes, . .	5
Deficiency, . . .	38	7	5	Interest on loan, . .	76
	£1,106	16	11		£1,10
1874.					
				Wages, tradesmen's bills,	
Rents, etc., . . .	848	14	9	and other expenses, .	25
Fluid sewage, . .	86	12	6	Rates and taxes, . .	4
Deficiency, . . .	118	4	1	Interest on loan, . .	75
	£1,053	11	4		£1,05
1875.					
				Wages, tradesmen's bills,	
Rents, etc., . . .	890	8	5	and other expenses, .	39
Fluid sewage, . .	145	18	0	Rates and taxes, . .	3
Deficiency, . . .	128	11	0	Interest on loan, . .	73
	£1,164	17	5		£1,16

Cheltenham was reported so indefinitely in the r already given,* that it was not thought to be disposing sewage by irrigation. It should, therefore, be added list of towns in Table XV.

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* See page 90.

Cost of Bedford Farm.

The accounts of the sewage farm managed by the Borough of Bedford, show a considerable loss in 1875, especially when compared with the fair profit of £180 15*s*. 4*d*. in 1874.* A considerable part of this expenditure is for pumping.

Mr. John Lund, the Borough Engineer, kindly informs me that the loss for 1876 is estimated to be about £169.

Bedford Irrigation Farm.

GENERAL ACCOUNT AND BALANCE SHEET FOR YEAR ENDING 31ST DEC., 1875.

Dr.	£	s.	d.	Cr.	£	s.	d.
To stock, 31st Dec, 1874,	544	8	0	By sales of crops by auction,	1,807	19	9
working plant, 31st Dec., 1874,	269	9	0	sales of crops by manager,	387	11	8
labor,	510	16	11	stock in hand, 31st Dec., 1875,	418	4	0
manager's salary,	134	3	0	working plant and live stock, 31st Dec., 1875,	330	14	6
engineer's ditto,	69	11	6	sewage works,.	10	8	6
coals,	274	15	10	balance carried down,	351	7	5
horse, corn, keep, and straw,	91	13	6				
horse,	25	0	0				
machinery,	46	9	1				
seeds and plants,	107	15	0				
hire of horses,	13	14	6				
permanent works,	10	8	6				
auctioneer's commission and expenses,	111	3	3				
rents,.	917	4	0				
poor-rates,	92	0	3				
income tax,	18	3	2				
land tax,	3	1	2				
insurance,.	0	10	0				
miscellaneous tradesmen's bills,	65	19	2				
	£3,306	5	10		£3,306	5	10
To balance,	£351	7	5				

Cost of Dry Removal.

It is interesting to compare with these accounts of precipitation and irrigation the great cost of the dry-removal methods. In Manchester, there are "about 20,000 tub-closets and 23,000

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* Compare the Seventh Report of the State Board of Health, p. 382.

Lancashire middens [*i. e.*, privies] in use; night-soil is mixed with ashes; a portion is made into concentrated manure, and the remainder sold as common night-soil. Net cost of disposing of night-soil in 1875, after deducting receipts, £22,839 2*s*. 7*d*.; scavenging, £22,151 7*s*. 11*d*. The tub system has been found to be the best method of disposal of night-soil."

In Rochdale, the quantities collected weekly vary as the system is extended. For the week ending April 12, the quantities were 118 tons of excreta and 208 tons of refuse material, from an estimated population of 52,000, and the weekly cost, £74, excluding interest and depreciation, or 4*s*. 7½*d*. per ton, or £30 per 1,000 people. The total excreta collected last year was 5,398 tons, and of refuse 8,652 tons. The work is done by eighteen carters, eighteen guards, eighteen horses, three washers, one laborer, four inspectors, one horse-keeper, and one book-keeper.

Cost of No Removal of Sewage.

The sums, too, which have been spent in litigation and on account of injunctions, have been in some cases enormous; for instance: Baldock, £280; Barnsley, £1,468; Birmingham, over £10,000; Blackburn, £20,000; Chelmsford, £200; Crewe, £1,050; Kendal, £700; Leamington, over £2,000; Merthyr Tydfil, £10,675; Northampton, £12,000 to £15,000; Ormskirk, £650; Richmond, £2,000. In the latter town, they were compelled, against their own wishes, to take their sewage into the Thames, at a cost of about £20,000. Scarcely had the debt incurred in doing so been paid off, than they were called upon to take the sewage from the river.

Conclusions of English Local Government Board.

While this paper was going through the press, the report of a committee appointed by the Local Government Board of England to inquire into the several modes of Treating Farm Sewage, was received,—a most valuable document, of which only the conclusions can be given here. Mr. Rawlinson, the chief engineering inspector of the Local Government Board, was a member of the First Rivers Pollution Commission; Mr. Smith was secretary of the second commission.

CONCLUSIONS.

1. That the scavenging, sewering, and cleansing of towns are necessary for comfort and health, and that, in all cases, these operations involve questions of how to remove the refuse of towns in the safest manner and at the least expense to the rate-payer.

2. That the retention, for any lengthened period, of refuse and excreta in privy-cesspits, or in cesspools, or at stables, cow-sheds, slaughter-houses, or other places in the midst of towns, must be utterly condemned; and that none of the (so-called) dry-earth or pail systems, or improved privies, can be approved, other than as palliatives for cesspit-middens, because the excreta is liable to be a nuisance during the period of its retention, and a cause of nuisance in its removal; and, moreover, when removed, leaves the crude sewage, unless otherwise dealt with by filtration through land, to pollute any water-course or river into which such sewage may flow. We have no desire, however, to condemn the dry-earth or pail systems for detached houses, or for public institutions in the country, or for villages, provided the system adopted is carefully carried out.

3. That the sewering of towns and the draining of houses must be considered a prime necessity under all conditions and circumstances, so that the subsoil water may be lowered in wet districts, and may be preserved from pollution, and that waste water may be removed from houses without delay; and that the surfaces and channels of streets, yards, and courts may be preserved clean.

4. That most rivers and streams are polluted by a discharge into them of crude sewage, which practice is highly objectionable.

5. That, as far as we have been able to ascertain, none of the existing modes of treating town-sewage by deposition and by chemicals in tanks appear to effect much change beyond the separation of the solids, and the clarification of the liquid. That the treatment of sewage in this manner, however, effects a considerable improvement, and, when carried to its greatest perfection, may, in some cases, be accepted.

6. That, so far as our examinations extend, none of the manufactured manures made by manipulating town's refuse, with or without chemicals, pay the contingent costs of such modes of treatment; neither has any mode of dealing separately with excreta, so as to defray the cost of collection and preparation by a sale of the manure, been brought under our notice.

7. That town-sewage can best and most cheaply be disp and purified by the process of land-irrigation for agricultu poses, where local conditions are favorable to its applicat that the chemical value of sewage is greatly reduced to the by the fact that it must be disposed of day by day through entire year, and that its volume is generally greatest when the least service to the land.

8. That land-irrigation is not practicable in all cases, and fore, other modes of dealing with sewage must be allowed.

9. That towns, situate on the sea-coast, or on tidal estuari be allowed to turn sewage into the sea or estuary, below the low water, provided no nuisance is caused; and that such getting rid of sewage may be allowed and justified on the economy.

Robert Rawlins
Clare Sewell R

S. J. Smith, *Assistant.*

July 21, 1876.

Experience in Germany.

On the continent of Europe, the work of sewering goes on slowly, as there are strong prejudices in fa more primitive methods to be overcome. The sew Frankfort-on-the-Main, built under the direction of t tinguished English engineer, Lindley, are without qu the finest in the world. Düsseldorf, Crefeld, Basel, Stu Heilbronn, Munich, and Hanau have introduced or are ducing similar sewerage after the same plans. In a read before the International Congress at Brussels, Mr. ley said that it was proposed to deal with the sew Frankfort by irrigation, as soon as the amount of pollut the river Main demanded it.

Berlin.

In Berlin, over sixteen hundred acres of land have bought for the third "radial system" (two German south-west from the city), and the sewerage of the str going on rapidly, to be finished probably this winter. what more land than for the south-western district has bought for the fourth "radial system," north-west o city, and the work is probably already begun. The disposal of the sewage of a city of over three-quarters of a million inhabitants, by irrigation, is certainly a bold undertaking, and the results will be looked for with great interest.

AUSTRIA.

Under the German laws, allowing local authorities to require manufacturers to cease from contaminating streams, when they think the occasion demands such action, one case has come to my knowledge during the year. In a large brewery near Vienna, where one thousand cubic meters of water were polluted daily, defiling an otherwise pure stream, measures were taking[*] to close the establishment, when the proprietors clarified their refuse by precipitating with sesquichloride of iron, with such success that further action was stopped.[†]

FRANCE.

Objections to Irrigation below Paris.

In Paris, the proposition of the authorities to extend the system of sewage-irrigation so as to dispose of the whole three hundred thousand meters discharged daily, has called forth loud protests in the form of petitions and addresses[‡] and propositions of other remedies for the pollution of the Seine, which is really a filthy sewer, and very offensive to people living on its banks, for many miles below the sewer-outlets.

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[*] The law in Austria punishes with a fine any one who casts into any well, cistern, river, or brook *used for drinking, or for brewing beer*, any dead animal, or *anything else* whereby the water is polluted and rendered unwholesome.

[†] La Santé Publique, April 1, 1876.

[‡] Traitement des Eaux d'Égout: Traitement des Eaux Industrielles. A. Gérardin, Société Générale d'Épuration et d'Assainissement des Villes. Paris. 1876.

Memoire sur L'avant-Projet de Dérivation des Eaux d'Égout de la Ville de Paris, par M. le Dr. Salet, Président du Comité d'initiative.

Des Résultats de l'irrigation de Gennevilliers par les eaux d'égout de la Ville de Paris. Étude par les docteurs Danet, Bestin, et Garrigon-Desarènes. Paris. 1876.

Assainissement de Paris. Épuration des Eaux d'Égout et des matières de vidange. Application des Procédés Knab. Paris. Société Générale d'Épuration et d'Assainissement des Villes. 1876.

L'Assainissement de Paris et la Société provisoire de Bondy. Justin Dromel. Paris. 1875.

Sewage of Paris.

About four hundred and fifteen thousand cubic meters of water are used in Paris daily; nine-tenths of the cesspool-drainage are still unconnected with the sewers, but, after being removed to the forests of Bondy, drain away a very large part of their liquid constituents into the main sewer, discharging at St. Denis; the other intercepting sewer, draining the better parts of the city, has little or no manufacturing refuse poured into it, and is some distance higher up the river, while, between the two local sewers, drains from factories, and a few polluted tributaries* of the Seine, empty into the river. The sewage of Paris constitutes about one-fifteenth of the ordinary flow of the Seine.

Irrigation with the Sewage of Paris.

In 1869, sewage-irrigation at Gennevilliers began on a small lot of sixteen acres belonging to the city of Paris, and each year the amount of land fertilized in that way by the farmers has been increasing, as shown by the following figures:—

1869,	16	acres irrigated.
1870,	55	" "
1871,		(War, etc.)
1872,	111	acres irrigated.
1873,	221	" "
1874,	289	" "
1875,	314	" "

A difficulty was encountered here, in the fact that the land irrigated with sewage was owned by private parties, most of them farming on a few acres, and there was very little system or certainty in the purification of the sewage.

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* *Conseils de Salubrité*, in many cases in France, require manufacturers to let their refuse settle in tanks before running off, thus separating and keeping out of the rivers the solid parts; but the result of such action has often been to drive them to places where their pollution of the streams would not be complained of. Even in some parts of Paris, the small streams have become quite foul.

Intercepting Sewer and Deep-Sea Outlet.

Accordingly, a plan was considered by a commission consisting of MM. Kleitz, Chatonay, Belgrand, Alphand, Mille, inspecteurs généraux des ponts et chaussées; Krantz, Vaudray, ingénieurs en chef; Calon, Depaul, ex-conseillers municipaux de Paris; Chevalier, Bonder, membres du conseil de salubrité; for conveying the filth of Paris to the sea by a sewer, more than one hundred miles long: but it was finally pronounced impracticable. Another proposition* then was to build a long sewer to follow the valley of the Seine, crossing the river four times, and, on reaching Canteleu, to be still some distance from the sea. This conduit was to be one hundred and forty-four kilometers long, of which thirty were to be covered, two were to be in siphons, and the rest open. It was to pass through four departments, and was estimated to cost ninety million francs. The sewage was to be used by the farmers as they wanted it, and little was supposed to be left to be discharged at the outlet. This plan, also, failed to get the approval of the authorities.

Precipitation.

Experiments for one year with another of the precipitating processes, after so many had failed, also met no approval with the authorities, although, as usually occurs, the company claimed excellent results. The process consisted of two long canals, to be used alternately, and of two compartments each. In the first compartment, the suspended matters were allowed to collect, as far as may be, by simple subsidence; in the second, a precipitating mixture of phosphate of lime and muriatic acid was used for further removing insoluble ingredients. The effluent was represented as looking clear, and as containing no more soluble organic matter than would be oxidized on exposure to the air. Nothing is said of the value or salableness of the sludge. The statement was made that 300,000 cubic meters of sewage a day may be treated in this way at an annual expense of 1,080,000 francs, but I have not been able to find the actual amount of money expended on the trial.

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* Assainissement de Paris. Des Eaux d'Égout et des Vidanges. Leur utilisation à l'agriculture par irrigation dans leur parcour jusqu'à la mer. Mémoire à M. le Préfet de la Seine: à M. le Président et à MM. les Membres du Conseil municipal de Paris, par F. Ducuing, le Président de la Société des Études, Membre de l'Assemblie Nationale. Paris. 1875.

Present Condition, Objections, Etc.

The city of Paris had agreed with the authorities of Gennevilliers, in 1872, to use the land for irrigation three years; and again, in 1873, another contract was made for ten years, a length of time which was then thought necessary to test the matter fully. In March, 1876, however, pressed by repeated complaints of the filthy state of the river, the municipal council of Paris voted to take into consideration a plan for utilizing the whole of the sewage of the city, by carrying it to the forest of St. Germain and irrigating—

In Gennevilliers, ...	1,354 hectares.
Nanterre, Rueil, ...	1,550 "
Carrières, Argenteuil, ...	857 "
Sartronville, ...	558 "
The Forest of St. Germain, ...	1,423 "
The Commune of Achères, ...	917 "
	6,659 hectares.

Of this, the forest of St. Germain belonged to the state, and the rest to private owners, large and small; the forest was to be used for absorbing all the sewage not needed in cultivating the arable land.

A protest was at once sent from the town of St. Germain, which had something of a reputation as a health resort, signed by 2,925 persons; and the authorities of the various towns also objected. Several petitions were also sent from Gennevilliers, one of which was signed by 414 persons, maintaining that the sewage-irrigation had raised the level of the ground-water, had polluted their wells, had flooded their cellars, and had caused intermittent fever to become endemic there, beside creating an offensive odor. These allegations have been denied by commissions on the part of the city of Paris: the high level of the ground-water was said to have been caused by an inundation of the river; and Dr. Georges Bergeron, the commissioner to examine into the question of the fever, presented an elaborate report, stating that intermittent fever had been for years prevalent at Gennevilliers, never more so than when operations in irrigation were suspended by the war, and not at all increased since the introduction of sewage-irrigation. He showed, too, that the fever prevailed least in that part of the penisula where the sewage was freely applied to the land, and most in some low, wet land which was not irrigated.

The people of Gennevilliers are not satisfied with these results, and have petitioned[*] the National Assembly for a commission appointed by the state, to investigate the matter. The municipal authorities of Paris, too, have petitioned the same body to have their plans approved by getting on them the stamp of *utilité publique.*

It is quite possible that the processes have not always been carried on with sufficient care, and that in some cases too much sewage has been put on the land. Even M. Belgrand, so long at the head of the Sewer Department, says, in his report for 1875, that the question of the utilization of sewage is settled, so far as the physical difficulties are concerned; the sanitary bearings of spreading three hundred thousand cubic meters of sewage over twelve thousand acres of land daily, he considered not yet settled.

As regards this matter, the following letter from M. Alfred Durand-Claye, very kindly sent in reply to our inquiries, states the whole question in a clear light. Much that he says, in a general way, of the objections of interested parties, would apply to England as well. The official and other documents,[†] for which we are also indebted to him, corroborate his statements.

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[*] This petition has been referred to the Minister of the Interior and to the Minister of Public Works. The question, of course, cannot be settled at once.

[†] Assainissement de la Seine, par M. Alfred Durand-Claye, ingénieur des ponts et chaussees. Paris, 1875.

École des Ponts et Chaussées. Conférences sur l'Assainissement Municipal, par M. Alfred Durand-Claye, ingénieur des ponts et chaussées. Paris, 1875.

Utilisation des Eaux d'Égout de la ville de Paris. Rapports et extraits des Procès-Verbaux des Séances. Société Centrale d'Horticulture de France. Paris, 1876.

Utilisation Agricole des Eaux d'Égout. Rapport, etc., Société des Agriculteurs de France. Paris, 1876.

Assainissement de la Seine. Enquête sur l'origine des fièvres paludéennes observées a Gennevilliers pendant les années 1874 et 1875, et attribuées par les habitants de cette commune aux irrigations faites dans la presqu'île avec les eaux d'égout de Paris. Rapport par le Dr. Georges Bergeron, professeur agrégé de la Faculté de Médecine de Paris.

BOARD OF WORKS OF THE CITY OF PARIS,
DEPARTMENT OF WATER SUPPLY AND SEWERAGE,
December 9, 1876.

DEAR SIR:—In reply to your letter of November 13, I have the honor to send you the following statements:—

The first attempts to purify and utilize the sewage of Paris were made in 1867. During the years 1867–68, a single plot of 0.69 hectare* was irrigated at Clichy, near the outlet of the intercepting sewer. . . . In 1869, works were undertaken to carry the sewage across the Seine, to the plain of Gennevilliers. In 1870, when the war brought hostile works to the environs of Paris, more than 21 hectares were irrigated with sewage. . . . During the next two years the sewage was not utilized, the bridges across the Seine having been destroyed, and the pumps having been injured by shells.

In June, 1872, when the works were ready again, not only did the farmers cultivating the 21 hectares previously irrigated return to that method of cultivation, but the irrigated area reached an extent of 45 hectares. The pumping-engines of 40-horse power, which had been thus far sufficient, failed to do the work, and a powerful engine was put up at Clichy to pump a greater portion of the sewage from the intercepting sewer; at the same time discharging some of the sewage at St. Ouen by gravitation from a reservoir. The irrigated surface was then 115 hectares.

In 1875, the distributing conduits had been extended so as to reach the whole surface of Gennevilliers; the pumping-engines were of 400-horse power, and the surface irrigated in August, 1876, was 228 hectares, now reaching about 300 hectares.

The whole of this land belongs to proprietors who use the sewage on their plots at their own expense and risk. The city of Paris provides only the main conduits; the farmers prepare all the other requisites at their own expense. The sewage is given free to all, except those who want a long concession, to whom from 25 to 50 francs a hectare are charged on agreements for 12 to 30 years. The farmers use the sewage in quantities to suit them,—on an average, 50,000 cubic meters a year for each hectare of the porous soil of the plain of Gennevilliers.

These results having appeared thoroughly convincing, and the purification of the sewage by chemical processes having been necessarily abandoned, by reason of their practical inefficiency and high cost, we have laid out the general plan designated in the map which I send to you.

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* The table of the metric system is given on page 16.

The irrigation now carried out at Gennevilliers will be extended by the main conduits proposed, so as to take in the other lots, forming a surface of 6,000 hectares. The amount of sewage found sufficient being 50,000 cubic meters a hectare each year, and, the sewage of Paris amounting to 100,000,000 cubic meters a year, 2,000 hectares would be enough; but, in taking three times that amount of land, we expect to get better and more speedy purification of the sewage. The land north of the forest of St. Germain belongs to the state, and forms a large space where the conduits end, and where the sewage not needed by the farmers can be disposed of.

This project has been made the subject of examination by the authorities during the past summer, whose reports I will have the honor to send to you as soon as they are given to the public; and I will also inform you when the plan has received official sanction.

To recapitulate: from the close of the war in 1872, to 1876, the surface irrigated voluntarily by the farmers in Gennevilliers, has increased from 20 hectares to 300. The amount of sewage used annually for each hectare has been 50,000 cubic meters. This year we have used over 10,000,000 cubic meters. The chemical processes have been given up. The definite plan by which all of the sewage of the city is to be utilized, has been drawn up and submitted to the authorities.

This natural development of the system, since the city does not itself carry out the irrigation, is the best reply to the criticisms which have been made by certain persons. In a work so new, and which has already reached such magnitude, it is impossible to avoid counter-statements, often made, too, with some heat. We would not presume to say that we have avoided every kind of mistake. Indeed, by the very freedom with which we have allowed the sewage to be used, some private interests have been injured. It is clear, for instance, that the dealers in chemical reagents, and inventors of processes of precipitation, are by no means pleased to see the plain of Gennevilliers covered with irrigated fields; this free and spontaneous development of sewage-irrigation is the absolute condemnation of their inventions and systems. Hence come complaints, criticisms, articles in the papers, etc., in reply to which we offer the statements of the three or four hundred farmers who are actually using the sewage on their land.

It has been said that ill health and fevers have resulted. But an eminent physician of Paris, *professeur agrégé* of medicine, M. Bergerons, has made an exhaustive investigation of the subject. I send you a copy of his report, from which you will see that he shows that there have been no insanitary influences from the irrigation.

Hoping that I have been able to meet your wishes,

I am, with distinguished regards,

Respectfully yours,

ALFRED DURAND-CLAYE.

Dr. CHAS. F. FOLSOM, *Secretary of the State Board of Health, Boston, U.S.*

SOME OBJECTIONS TO SEWAGE-IRRIGATION CONSIDERED.

It must be acknowledged that part of the complaint at Gennevilliers is verified by experience elsewhere. Müller, for instance, has shown* that in the beach-sand of the sewage farm at Dantzic, the ground-water contained a considerable proportion of ammonia, and had an offensive odor on standing.

Dr. Lissauer of Dantzic has made most exhaustive researches and experiments† in this subject, from which he shows that the ground-water of the sewage-farm of that city is somewhat modified by the process of irrigation, and that, therefore, all the sewage is not taken up by vegetation, but that a certain portion, even in summer (as all must in winter), depends for purification on filtration and oxidation alone. In time of storm, too, when the ground is saturated, particles of sewage occasionally pass through unoxidized, and, therefore, no wells in the vicinity should be used for drinking-water. It is recommended that trees be planted on the edges of sewage-farms, to *complete* the purification.

At Croydon,‡ "when certain fields were being irrigated, the different water-courses in the neighborhood of the field rose and discharged effluents, which went off indirectly into the Wandle; and in some of the wells attached to cottages upon the farm, in two or three instances, when the fields in the neighborhood were irrigated, the water rose, and fell when it was taken away, showing that they were affected by the irrigation," although the water has always been pure, as the experiments at Eton § show that it is likely to be, where the soil is not so loose and sandy as to allow the sewage to run rapidly through it.

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* Deutsche Vierteljahrsschrift f. öff. Gesundheitspflege, VIII., 187.

† Hygienische Studien über Bodenabsorption, Frankfurt-am-Main, 1876.

‡ Society of Arts Conference, p. 69. § Ibid., p. 23.

> "Last year, attempts were made at Eton to trace the course of the upper subsoil waters; holes were dug on the farm to the subsoil, and filled with sewage, into which was put chloride of lithium. Samples of the water from the neighboring wells, examined with the spectroscope, gave no result; holes were then dug within a few yards of the first holes, but the subsoil water from these showed no trace of lithium; it is possible, however, that the chloride of lithium may have been converted into the oxide or carbonate, and so remained fixed. The experience at Eton, therefore, rather leads one to suppose that the width and depth of the volume of subsoil water all round the farm is so great, that the effect of the sewage, so far as analytical tests are concerned, would be lost, almost directly, and that samples of the subsoil water taken on the line of its flow, one hundred yards above and one hundred yards below the farm, would not show any appreciable difference."

At Gennevilliers, too, according to M. de la Trehonnais,—

> "Sewage, containing forty-three grammes of nitrogen per ton before its application to the land, when analyzed after percolation through the soil, gave scarcely any trace of it in a decomposable state. Only 1.6 grammes of nitrogen in a state of mineral ammonia could be found. It was the same with the quantity of soluble oxygen. The sewage-water, when laid on the land, scarcely contained two cubic centimeters of oxygen per quart. On its effluence from the soil, it was found to contain from eight to ten, which is the unerring characteristic of healthy water."

At Meerut, the water-level was found to have risen, in consequence of canal-irrigation, from fourteen feet below the surface, on Oct. 31, 1869, to nine feet seven inches at the same date in 1874; but it is expected that this will be remedied by drainage-works.*

EFFECTS ON HEALTH OF BAD DRAINAGE.

It is no new idea that good sewerage and drainage are essential to health. As far back as 1834, one of the leading medical men of London gave his evidence that four-fifths of the cases of typhus fever (probably typhoid, as the two diseases were not distinguished then) which he witnessed, he could trace to foul drains and foul gullies; and even i attempt to cleanse houses, we foul rivers, should we n with one of the first living sanitarians, "Whether is i to pollute rivers or pollute houses or towns? to kill to kill men?"

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* Report on Sanitary Measures in India in 1874–5. London, 1876.

Sources of Disease.

Unfortunately, the year's experience has added positive to our meagre knowledge of the agencies cause or communicate disease.

Contaminated Water.

Prof. Wanklyn thinks that the contagium of the d communicable by infected water are of an albuminoi acter, and of such definite form, etc., as to be remo efficient filtration. Dr. Alfred Carpenter, whose years' experience at Croydon entitles his opinion t consideration, says: *—

> "The most important operation which takes place on a farm, is the destruction of contagious particles. The mom are brought into contact with the spongioles on the roo sewage-grown crops, as may be easily seen in any field of r which is being irrigated by sewage, the spongioles seize u albuminous matters in the sewage by a kind of elective including the contagium-particles, remove them from the w digest them with an avidity which is most remarkable; no p tion takes place, no retrograde decomposition arises, but t minous matter is digested as perfectly as white of egg is by the human stomach. Putrefaction is no part of sewage tion, and, if putrefaction takes place, there is a corres decrease of productive power, and also a proof that sewage is not properly carried out."

The late Dr. Letheby, formerly health officer of t of London and chemist to the Thames Conservancy held the theory of the ready destructibility of diseas municating matter, and always maintained that with filtering the Thames, although polluted, supplies saf to London.

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* Address on Public Medicine before the British Medical Association,

The Purist Theory.

Prof. Frankland and many others hold the opposite theory, and their position is well shown in the sixth report of the Second English Rivers Pollution Commission, published early in the year; a most exhaustive work on the water-supplies of that country, and in which the conclusions that have been reached are based upon the examination of more than two thousand samples of drinkable water.

They condemn river-water because it is liable to contamination from drainage of cultivated land, towns, and manufactories; also shallow-well water, because it "often consists largely of the leakage and soakage from receptacles for human excrement," and they recommend,—

1. Spring-water.
2. Deep-well water.
3. Rain-water.
4. Upland-water.

Of these four, "evidence of previous sewage or animal contamination is strongest in the case of spring and deep-well water; but this evidence may, in the case of these waters, be safely disregarded" (p. 425), and (p. 17) "because the prolonged filtration to which such water has been subjected in passing downward through so great a thickness of soil or rock, and the rapid oxidation of the organic matters contained in the water, when the latter percolates through a porous and aerated soil, afford a considerable guarantee that all noxious constituents have been removed."

They classify waters for domestic use thus:—

Wholesome.	1. Spring-water.	Very palatable.
	2. Deep-well water.	
	3. Upland-surface water.	Moderately palatable.
Suspicious.	4. Stored rain-water.	
	5. Surface-water from cultivated land.	Palatable.
Dangerous.	6. River-water to which sewage gains access.	
	7. Shallow-well water.	

Among their conclusions are these:—

> "Of all the processes which have been proposed for the purification of sewage, or of water polluted by excrementitious matters,

there is not one which is sufficiently effective to warrant the use for dietetic purposes of water which has been so contaminated."

"The admixture of even a small quantity of these infected discharges [of persons suffering from cholera or typhoid fever] with a large volume of drinking-water, is sufficient for the propagation of those diseases amongst persons using such water.

"The most efficient artificial filtration leaves in water much invisible matter *in suspension*, and constitutes no effective safeguard against the propagation of these epidemics by polluted water.

"Boiling the infected water for half an hour is a probable means of destroying its power of communicating these diseases."

They recommend giving up the present supplies from the Thames and the Lee, thinking that there is no hope of the "disgusting state of the river being so far remedied as to prevent the admixture of animal and other offensive matters with the filtered water as delivered to the metropolis," although the Thames is far worse than the Lee; and they say that immense numbers of the population of the towns throughout Great Britain are "daily exposed to the risk of infection from typhoidal discharges, and periodically, to that from cholera dejections."

Contaminated Air and Soil.

Virchow has concluded from his investigations,* that the level of the ground-water does not in all cases bear a definite relation to the prevalance to typhoid fever, and never unless the soil is polluted. He shows that the experience of German cities corroborates Dr. Buchanan's demonstrations with regard to England, that typhoid fever has been materially decreased by the introduction of good water and sewerage. Polluted water he considers the main cause of its spread, although he differs with most sanitarians in thinking that it is in some degree directly contagious.

Dr. Liévin, of Dantzic, after a minute investigation,† has proved that "the life-saving influence of their new sewerage-system is clearly shown."

Pettenkofer still holds to the theory that the chief agency in spreading typhoid fever and cholera, is the decomposition of organic matter in the soil from variations in the level of the ground-water, allowing the virus to escape into the air. So far as Munich is concerned, he thinks that the drinking-water has little to do with the production of those diseases, although he acknowledges that some of the contagium may be conveyed as well into the water we drink as into the air we breathe.

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* Deutsche Med. Wochenschrift, I. and II., 1876.

† Die Sterblichkeit in Danzig vor und seit dem Jahre 1872. Danzig, November, 1876.

Many authorities hold, that the "disease-germ," if there be such a thing, is not dangerous until decomposition has set in, and that it can therefore be very easily destroyed if care be taken.

Oxidation of Sewage.

It is well known that by the action of the soil, the carbon in sewage becomes carbonic acid, the hydrogen water, and the nitrogen ammonia, nitrates and nitrites; the sulphur unites, most of it, with the iron which is found in the earth. The amount of nitrogen as nitrates and nitrites is therefore considered as the chief element in the evidence of "previous sewage contamination," given in Dr. Frankland's monthly tables of examinations of the eight sources of water-supply of London; but this is evidently fallacious, for, by the returns of July and November, 1875, the purest water (from the Kent Company) is shown to be in that respect, respectively fifty per cent. and nearly two hundred per cent. worse than the worst of the river-supplies, so that the following qualification is published: "As the Kent Company's water is unpolluted, and as it is drawn from deep wells, the evidence of previous sewage or animal contamination which it exhibits may safely be disregarded"; and in the explanatory notes published each month, we find this sentence referring to the river-waters, and not especially to the Kent wells: "By gradual oxidation, this animal contamination has been, so far as analysis can show, converted into innocuous inorganic compounds before the water was submitted to investigation."

The theory of Dr. Frankland with regard to this evidence of "previous sewage contamination," is understood to be, that if there is uniformly in water what was organic matter which has been thoroughly oxidized, there may be at times some which has not been oxidized, which is too slight to be detected

by chemical examination, and which may produce di
Sir Edmund Becket says[*] that the logical deduction fro
"purist" theory is, that "a particle of sewage sent ir
Thames at Oxford, arrives as a particle of sewage at l
ton, and may poison a man in London."

Filth not Safe.

Whatever theory of *bacteria* and "germs" proves tr
evidence accumulates each year to show: 1st. That
certain conditions human excrementitious matter in
diseases is almost certain poison, producing the parent-
in a great number of cases of those exposed to it, and
degree of virulence proportional to its concentratio
That we must either acknowledge that these disease
cially cholera and typhoid fever, may arise *de novo*[†] un
tain conditions of filth not yet wholly known, or else
contagious matter is of extraordinary vitality, and ca
being conveyed in manners and to distances not now
suspected.

Specific Poison Theory.

If the fact be true, that such diseases arise with
specific poison from a previous case, many epidemics
explained which are otherwise entire mysteries; but i
be difficult to account for the dozens of cases to whi
a farmer can point, where a family have for years u
water from a well close to an accumulation of filth,
apparent harm, except on the theory that the filth
sufficiently concentrated, or that a healthy person livi
generally healthful conditions is usually able to res
deleterious influences until his system is, for some
other, below par.

Illustrations from Poisoned Air.

A few striking cases have been investigated during
year with an exactness which has left little to be ask
make the deductions appear as absolute certainties.

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[*] London Times, January 10, 1876.

[†] Some striking illustrations of this theory may be found in the Brit.
nal, May 27, 1876, and in Braithwaite's Retrospect, Part LXXIV.

Croydon.

So much attention has been paid to practical sanitation in Croydon, that a severe epidemic of typhoid fever, with 1,200 cases and 104 deaths, was looked upon with some alarm. Mr. Baldwin Latham, C. E., attributed it to the condition of the deep wells from which part of the water-supply was got, thinking that they were necessarily contaminated when the water was low,[*] but the chemists proved that the water was always pure, so far as analysis showed; and, if there were at any time sufficient impurity in any deep wells to cause disease, it was thought that frequent chemical examinations would show that something was wrong.

Dr. Alfred Carpenter, chairman of the Sewage Farm Committee, attributed the outbreak to the pollution of the drinking water by means of the intermittent system of supply,[†] the pipes, when empty, having become filled with sewer-gases through the valves used to flush the sewers. It was shown that such fouling of the water did occur, and in one case even the blood of a neighboring slaughter-house was drawn up into the water-pipes.

A most minute investigation was afterwards made by Dr. George Buchanan,[‡] in the course of which he was able, by the coöperation of the physicians of Croydon, to locate all the cases, fatal and non-fatal, with very few exceptions.

In "Croydon Parish," the 1,164 cases occurred in 959 houses, as follows: in January, 15; February, 53; March, 79; April, 186; May, 39; June, 30; July, 18; August, 32; September, 69; October, 275; November, 94; December, 71. A few cases occurred in May, June, July and August, of which the records of location were not got. It is not possible to give here more than the results of the inquiry.

Although finding that, by an intermittent supply, a certain number of cases of typhoid might have occurred through contamination of the water, Dr. Buchanan says, "I satisfied myself that in a very considerable majority of the Croydon houses that have had fever, drain-air, charged with infection from the common sewers of the town, has had the opportunity of entering the houses," and this sewer-air "was, throughout 1875, charged to an intense degree with the infection of enteric fever." To this condition he attributed the epidemic.

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[*] Minutes of the Proceedings of the Institute of Civil Engineers, Vol. XLV., pp. 74 *et seq*. London, 1876.

[†] Sanitary Record, November 27, 1875, pp. 391 *et seq*. Also London Times, December 25, 1875.

[‡] Report of the Medical Officer of the Privy Council and Local Government Board. New Series, No. VII., pp. 40–71. London, 1876.

An interesting fact brought out during this investigation was, as had indeed already been shown elsewhere, that the presence of sewer-gas was indicated in some cases by a slight noise as it escaped from an aperture in the pipe, even when there was no smell. How far and when such gas may be nocuous or innocuous we are not yet warranted in saying positively; but all such cases should evidently place the benefit of the doubt on the side which is safest.

Fever at Fort Cumberland.

In another case, a severe epidemic of sixty cases of enteric fever, with four deaths, was fairly traced to sewage-contaminated air breathed,* but there appears no statement whether this air was especially infected from other cases of fever or not. The facts are these. A large number of troops were stationed at Fort Cumberland at the harbor-entrance, and close to flats bare at low tide. The sewage of Portsmouth had usually been discharged at ebb tide, but, having recently been pumped into the harbor on the flood, a large amount was deposited on the mud banks near the fort, and to this the fever was clearly traced upon inquiry. The troops were all removed, the evil was remedied, and the epidemic ceased.

Fever at Uppingham School.

In the summer of 1875, typhoid fever broke out in a school of four to five hundred boys at Uppingham, England, and in the autumn several died.† The school was dispersed November 2, and its sanitary arrangements were carefully examined by Mr. Tarbotton, the local engineer, and Mr. R. Rawlinson, C. B., who suggested the proper remedies; but before these were carried out, and, contrary to the advice of the health officer, the school was reassembled in the following January, when the fever reäppeared and the occurrence of four cases demanded that the scholars should again disperse. Mr. Rogers Field, sanitary engineer, of London, was then engaged to prepare plans suggesting the proper remedies, which he at once proceeded to do. He found the sewers too flat in some cases and insufficiently cleansed; the main discharge was into tanks at the sewage farm, which were sometimes emptied at long intervals, thus allowing the sewage to accumulate, putrefy, and back up the sewers. He says in his report,* "the town is, at the present time, essentially a cesspool town," and "nearly every house has its own well, very many of which are situated near cesspools or other sources of contamination." Of the twelve houses constituting the school, he adds, "twelve drain either wholly or for the most part into cesspools," and "in ten houses, each has one or more of its wells badly situated from contiguity to cesspools or foul drains." A noteworthy incident connected with this investigation was that one of the gentlemen connected with it contracted typhoid fever from a short exposure while standing over the fouled drains, while the workmen, although longer exposed, escaped.

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* Public Health, London, November 27, 1875, pp. 713 and 714.

† London Times, March 17, 1876.

Composition of Sewer-Gas.

It is unfortunate that we do not know the exact components of sewer-gas, and that there are no means of ascertaining how it acts upon the system. So far as chemistry goes, the Sewer Department of Paris have shown what the concentrated gas is, which bubbles up to the surface from the sewage-beds at the bottom of the River Seine. It is probably not unlike (except in degree of dilution) what is in our sewers, and was found to be—

Carburetted hydrogen,	72.88	Sulphydric acid,	6.70
Carbonic acid,	12.30	Other substances,	5.58
Oxide of carbon,	2.54		
			100.00

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* Uppingham Sewerage and Private Drainage. Report of Mr. Rogers Field to the Rural Sanitary Authority, January, 1876.

Polluted Water.

Two cases, forcibly illustrating the danger of pollution water-supplies, have been brought forward during the yea

Fever from Watered (?) Milk.

The first was of an epidemic of typhoid fever wl occurred at Eagley, in England, investigated by Mr. W. Power, one of the medical inspectors of the Local Gov ment Board, and at Bolton (two miles from Eagley), inv gated by Mr. Sargent, the health officer of the borough.

A certain small brook had been used by the operatives mill, so that "large quantities of fecal matter" were foun its banks and in its bed. It was known, too, that o the workmen was ill (it was thought that there was a bility of the disease being typhoid fever). This brool formerly been used, a couple of hundred yards belov domestic purposes, but had generally been abandoned it had become impure, although two families continu use it, of whom one had typhoid fever, and the other boiled it before use) escaped. This same water con to be used at a dairy (A), and was the only supply Although there was no positive evidence that the mi diluted with it, it was acknowledged that the milk-can washed in it.

The outbreak of fever occurred at the end of January From January 30 to February 5, there were one hund three persons attacked; from February 5 to Febr there were twenty-eight persons attacked; from Feb to February 15, there were fifteen persons attacked, epidemic declined. The cases were distributed as fol

TABLE XXII.

No. of families supplied with milk from Dairy A.	Of whom were attacked.	No. of families supplied from other dairies.	Of whom were attacked.	No. of families not taking milk.
57	55	244	7	17

Of the eight not supplied from A, seven drank milk from Dairy A in other houses than their own; the eighth became ill in April, was not seen by a medical man, and is not certainly known to have had typhoid fever, although so reported. The milk was represented as having a sediment after standing, and as being of unpleasant taste and smell.

In Bolton, there were fifty families attacked, of whom forty-seven were supplied with milk from Dairy A, and Mr. Sargent says, "Not one household to which the milk was traced, did I find entirely free from the disease."

The coincidence of the disease in the two places is quite striking:—

TABLE XXIII.

	IN EAGLEY. New Cases.	IN BOLTON. New Cases.
For the week ending January 22, there occurred,	2	1
29, " "	6	9
February 5, " "	123	77
12, " "	37	16
19, " "	14	7
26, " "	8	5
March 4, " "	5	29*

The water used at the dairy (from the fouled brook) was analyzed by Mr. Sargent, and also the drinking-water of Bolton for comparison, with the following results in parts per 100,000:—

TABLE XXIV.

	Bolton Water (pure).	Eagley Brook.
Free ammonia, ...	0.001	00.20
Albuminoid ammonia, ...	0.006	00.26
Total solid residue, ...	7.910	193.00
Organic or volatile, ...	2.860	121.50
Chlorine, ...	3.580	128.80

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* Many of these were supposed to have been infected from other sources, as might easily have occurred so long after the outbreak, in a crowded community.

Enteric Fever at Lausen.

The second occurred at Lausen,[*] Switzerland, in 1872, b has been referred to quite often of late, and is especiall interesting, as proving, in a marked degree, the direct poiso like action of typhoid dejections, even when very muc diluted, illustrating the apparent immunity with which impu water may often be drank if not specifically contaminate and because the case has been generally used by the report and others [†] to prove what the facts by no means warran namely, that the contagium of typhoid fever is not separab or destructible by efficient filtration so as to be harmless. T fact may be so or not, but it can hardly yet be said to proven; and it is quite significant that the late Dr. Parke in referring to this outbreak, fails to make any mention this particular point.[‡]

The facts are these. In a house, A (see sketch on pag 125), a man became ill of typhoid fever, June 10, 1872, an recovered in September; a second case occurred July 1 ending in recovery in October; and in August there were tw others, mild and of short duration. The Furlen Brook wa contaminated with their dejections.

From the middle to the last of July, as was done each yea the land, C, was irrigated by diverting the stream over i and the water in the public well of Lausen, D, became s turbid and foul-tasting, that many people gave up using i This well distributes its water through the wooden aqueduc E, to the four public pumps marked by round dots; it is als at the junction of two quite small streams, one flowing fro the south-west and the other from the south-east.

In Lausen, a village of seven hundred and eighty inhabitants, in ninety houses, standing on gravelly ground, fro thirty-five to sixty feet above the level of the Ergolz and the ground-water, there had been no epidemic of typhoi fever since its occupation by soldiers in 1814, and not single case since 1865, when a few were imported from Base

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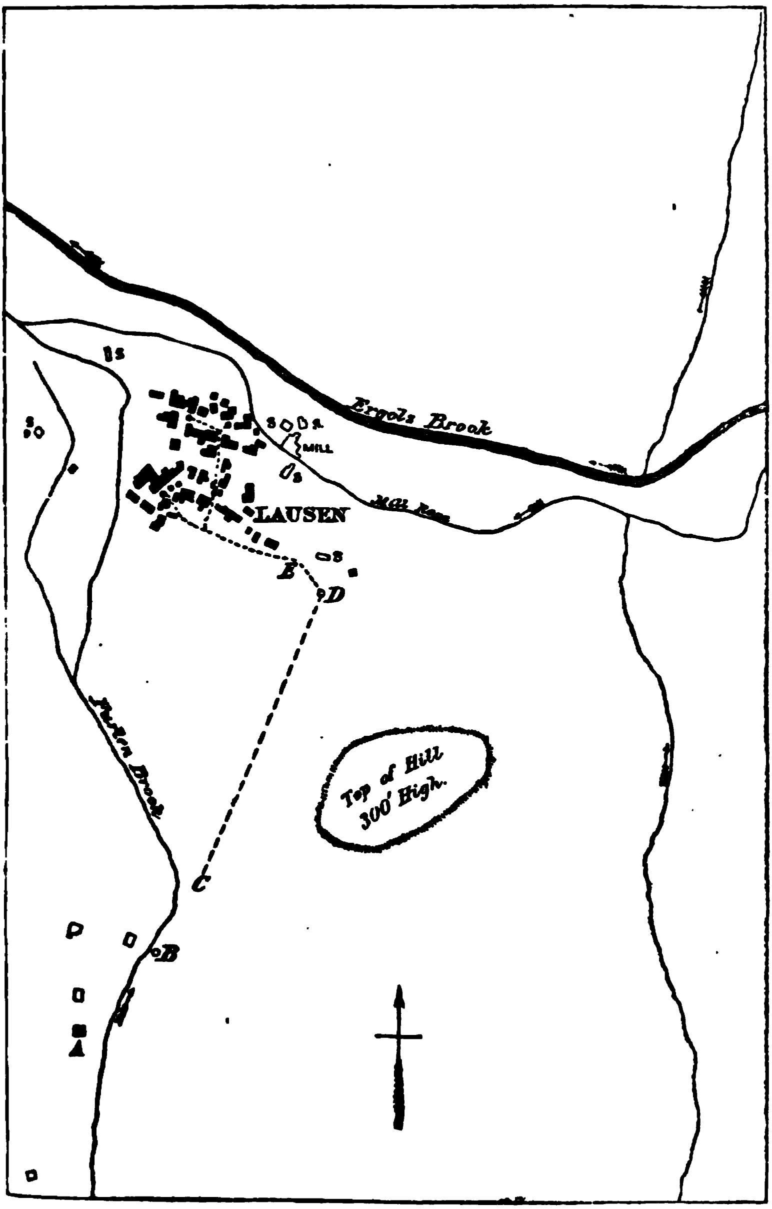
[*] Deutsches Archiv für Klin. Med. XI., pp. 237-267.

[†] The Lancet, London, July 15, 1876. Journal of the Chemical Society, Jun 1876. Sixth Report of the Rivers Pollution Commission, p. 463, London, 18 (referred to on page 115 of this Report). Deutsche Vierteljahrsschrift, f. öff. Gesun heitspflege, VI., 154.

[‡] Army Medical Department, Report for 1873, London, 1875.

The first case in the epidemic to be described was thought to have been imported, as the victim of it had been away from home during the probable period of infection.



MAP ILLUSTRATING THE EPIDEMIC OF TYPHOID FEVER AT LAUSEN.
[Deutsch. Arch. f. Klin. Med.]

On the 7th of August, 1872, ten persons in Lausen w attacked with typhoid fever; from the 7th to the 16th, fi seven; from the 7th to the 28th, one hundred; in tember and October, thirty, when the epidemic ceased. the one hundred and thirty cases, eight died; and b these, about a dozen children were attacked, who were sp ing their holidays in Lausen.

There had been no known communication betwee house, A, and Lausen. The six houses marked S are sup with their own private wells; in them only two person the fever, and they had drank the public water awa home. All who became ill had used the public wate the cases were distributed among all classes and cond of those who drank other water only, none had the fev

After excluding all other sources, it was thought Hägler, who investigated the case, that there could cause of the disease except in the public well, D.

If the contamination had come from the numerou vaults, there seemed no reason why the six houses m should have escaped. It is unfortunate, however, bearing of the question was not more fully inve especially as the soil was very dry, the ground-water more than thirty feet below the surface, and as exce heavy rains in May, July and August had caus temporary changes in the condition of the soil. D says, too, that the people were less neat in their ha the inhabitants of the neighboring city of Basel.

In 1862, a portion of the earth, marked by the had fallen in, forming a hole eight feet deep and wide, and having at its bottom a running stre appeared to be fed by the Furlen Brook from a po up. When the brook was let into this hole, the disappeared, and in an hour or two "streamed o well, D, showing a connection between the two tha suspected for years. The hole was then filled u brook returned to its bed.

The infected house, A, was about a mile from L it has been seen,—

1. That the Furlen Brook was contaminated w dejections in June, July and August.

2. That the contaminated water was used to irrigate the land, C, for the three weeks preceding the epidemic in Lausen.

3. That this irrigation-water, fouled by dejections, so polluted the well, D, as to make the water offensive.

4. That this water could not have been filtered, in any sense of the word, before reaching D, as it was turbid and foul enough to make many people give up the use of the well.

On making the investigation, some weeks after the epidemic, the hole, B, was reöpened as nearly as possible in the old place. A large quantity of salt was thrown into it, and its presence at D was soon ascertained by chemical examination. Then a considerable quantity of flour was put in at B; but its presence could not be detected at D.

Dr. Hägler's theory is that there is a communication between the Furlen Brook and the well, D, which allows water to pass through, but that it is efficiently filtered in its passage; and that the "germ" of typhoid fever may pass through nearly a mile of gravel, so complete a filter as not to allow flour to pass it, and yet be still an active disease-producing organism.

We cannot doubt, in the face of the evidence, that when the land, C, was irrigated there was abundant opportunity to foul the well, D, with the excreta of persons suffering from typhoid fever; but the facts do not prove the indestructibility of the contagium of disease by efficient filtering.

To make the conditions of the experiment correspond with the actual conditions, the salt and the flour should have been put directly into the brook, or upon the land, C, while allowing the brook to run over it.

Yellow Fever and Filth.

In the city of Buenos Ayres, during the year of the cholera epidemic (1867), one-twentieth of the population died; in 1871, the yellow-fever year, more than one-tenth perished, even counting the 60,000 who fled from the town. There has been a careful investigation of the causes of this fearful mortality, and filth has been shown to be so far responsible for it, that a distinguished English engineer has been engaged to carry out a complete system of sewerage and water-supply In the language of the report,* "the works of drainage an sewerage, so actively prosecuted at the present time, are de tined to radically remove this infection, which experience h demonstrated to be one of the most fruitful causes of disea and death."

During the past year, Savannah has had a similar ex rience, and very largely at least from similar causes.

An investigation † into the causes and conditions of yell fever in the United States, with the help of the library of Surgeon-General at Washington, and a personal experie of over two thousand cases, concludes, that nothing is important in the prevention of yellow fever as proper wa supply and sewerage. The writer farther says that discase "cannot be taken in a pure air from persons, clot trunks, or black vomit; but in an impure air, other tl being suitable, it can be taken from *either*."

Dysentery and Fever from Filth.

In the State Reform School for Western Pennsylvan outbreak of dysentery and typhoid fever affecting two dred and seventy persons, or *ninety per cent.* of the inr has been investigated by a committee of the Allegheny C Medical Society.

They conclude that it was due to poisoned drinking- It seems that the main water-pipe got its supply from in the Ohio River two hundred and fifty feet from the and a little below the outlet of the sewer from one privies, which, however, was close to the shore; water was often so shallow that it was possible to w on the pipe to within fifty feet of its end. The pri flushed twice a day, forcing out a large quantity of polluted water. This seemed sufficient to the cor after careful examination and exclusion of other su causes, to create all the difficulty, although they fou other insanitary conditions about the building. ‡

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* Vital Statistics of the City of Buenos Ayres. By G. Rawson, M. D., the International Medical Congress at Philadelphia, 1876.

† Yellow Fever and Malarial Diseases. By Greensville Dowell, M. Surgery, etc., 1876.

‡ Transactions of the Medical Society of the State of Pennsylvania Part I., pp. 147 *et seq.*

Earth Closets.

Pettenkofer's statement that earth is no better as a disinfectant than water, and that, in either system of removal, that is best which is speedy, efficacious, and least offensive, has been exemplified in the West Riding House of Correction, where, according to Dr. Ballard's report, there was "prevalence of enteric fever preceded and accompanied by diarrhœa;—infection probably spread by the use of infected earth supplied to earth-closets." *

The experiment tried at the Maryland Hospital for the Insane in using earth-closets, mentioned in the last report of the State Board of Health of Massachusetts, pp. 186–188, and adopted after $3,000 had been expended on account of litigation for pollution of a neighboring stream, has not proved entirely satisfactory. The closets are near windows, and when the latter can be kept open and the former are well attended to, there is no serious offence in the wards. At other times the odor is perceptible to quite a distance. The use of a sufficient amount of earth is often neglected, and the waste from bath-tubs, etc., is so polluting to the stream into which it is discharged, that fresh complaints have been made. Experience here, as elsewhere, appears to show that it is almost impossible to manage earth-closets so as to be as satisfactory as rapid and efficient removal by water.

PREVENTION OF FILTH DISEASES.

In order to avoid, in as great degree as possible, the evils of accumulated filth in crowded communities, it is necessary in the first place to have good sewers. After them, good house-drains are even of greater importance, for defects there are of greater danger than in sewers; and, if properly constructed and carefully watched, they may, to some degree, obviate the evils of bad sewerage.

House-drains, especially in tenement houses, by universal experience, are apt to be badly constructed or neglected unless controlled by municipal authorities; and there is no more important matter of sanitation now in our large citie than this. In Scotland, this control is exercised in some cities with good results.

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* Report of the Medical Officer of the Privy Council and Local Government Board. New Series, No. VII., p. 39. London, 1876.

In carrying out the new sewerage of Berlin, proprietor who wish to connect their drains with the public sewers mus prepare full plans, submit them to the sewer department receive the approval of that office, and finally have them inspected and declared satisfactory before they can be used.

The best regulations have been carried out at Frankfort-on-the-Main by the coöperation of Mr. Lindley and Dr. Varrentrapp. They are given here entire, as they show *what ha actually been done* in one city at least. In considering thei efficiency, we are not surprised to see Frankfort placed a the first city in Germany in the bulletins of health *(la statio sanitaire par excellence de l'empire allemand)*.*

Conditions under which Buildings, Yards, Gardens, etc., ar allowed to be Drained into the new Sewerage System.†

1. Whenever the drainage of any house, yard, etc., is projected, the owne of the property in question must, after having signed the requisite certificate,‡ furnish to the department, duplicate plans bearing the signature of th contractor, and containing a map of the locality on a scale of at least 1:2500 a ground plan at least 1:250, and a sketch of the main drain and branche with its horizontal plane on the same scale as the ground plan, and its profil at least 1:125.

The certificate and one of the duplicate plans are to be kept among th documents of the sewer department; the other plan must be always read for inspection by the officers at the place for which it is designed.

All plans presented must contain all the works projected; the exact positions of sinks, gullies, traps, and other details; the direction of the superficia water-carriers; the positions of the rain-spouts, cisterns, privies, wate closets, cesspools, vaults, wells, pumps, and other arrangements for wate supply; also the levels of the surface where the works are projected, includin the grades of the latter, the depth of the cellar, the lowest levels of th ground, and, where possible, the depth of the foundations,—all to be give by the standard grade.§

2. All drains are to be so arranged as to accomplish the most complet drainage practicable of the building and grounds. The drainage of cellar

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* La Sante Publique, November 1, 1876.

† *Bau-Amt zu Frankfurt-am-Main. Bedingungen, etc.*, [including plans and illustrations by W. Lindley, Chief Engineer, and J. Gordon, Resident Engineer.]

Das Schwemmsielsystem Frankfurts, geschildert von Dr. G. Varrentrapp, 1876.

Exposition Internationale d'Hygiène et de Sauvetage de Bruxelles. Canalisation d Francfort-sur-Mein; L'ingénieur en chef, W. Lindley, 1876.

‡ See page 133.

§ With us, the grade is usually calculated in feet above mean low-water mar In Frankfort, the *pegel* or O is an established level marked on the Frankfort Bridg where this is not desired, or where it is rendered impossible by their depth, may be omitted, if the proprietor so wishes.

The method of drainage, and the materials to be used, must be approved by the sewer department.

3. The drains may be constructed of brickwork, of glazed earthenware, of tarred iron pipe, or of other approved material, and are to be connected with the main sewers by special direction. Tarred iron pipes, lead-jointed, are recommended as the most durable and safest, and, in and near the houses, must be everywhere used as prescribed, with the following exceptions. Earthenware pipes are permitted within and without houses, if bedded in concrete whenever they lie deeper than the cellar floor, or not less than one meter from the nearest cellar-wall; within the house they must be encircled with a layer of concrete at least ten centimeters thick, and have their upper surfaces at least one-half a meter under cover. All drains must be jointed water-tight. The highest point of any drain outside of the house must lie at least 1.30 meters below the surface of the ground. Junction of drains at right angles, whether horizontal or vertical, is allowed only on special permission.

4. Whenever a change in the position of an existing outlet of a drain into a sewer is requested, and judged necessary or permissible by the department, it must be made at the owner's expense; the work must be done by order of the department, and subject to their control.

5. In buildings whose cellars are deeper than the highest level of the river (5.7 meters above O), all pipes whose open ends lie above this level must be separated from the cellar drains, and must be so constructed as to let their contents flow into the main sewers without obstruction, even at time of freshet; the drains for points below grade 5.7 must be shut off by flap-valves.*

6. Branch drains are usually to enter drains of larger calibre; the connection of drains of the same size with each other can be allowed only exceptionally.

7. The pipes for water-closets, yards, and stables must be not less than fifteen centimeters in diameter; for kitchens and wash-rooms, not less than ten centimeters as far as the siphon-traps, and from there onward (including traps), fifteen (inside measurement). Vertical soil-pipes, as far as they are put in new, must have a clear diameter of at least twelve and at most fourteen centimeters.

8. Rain-water spouts must be of at least ten centimeters inside diameter, and be carried underground into the sewers.

They are to be of iron, with cemented joints from a point at least two meters above ground, and the lower ends must be joined by cement to the first joint of the earthenware drain by a curved pipe, also of iron.

9. Wrought-iron pipes are to be tarred inside and out while hot. Straight pipes, when used, are to have as few joints as possible; arms for branches must be long enough to allow proper junctions. . . .

10. With a uniform inclination of more than 1:20, the grade of a main drain or of a rain-water pipe may be broken; but it is stipulated that the least fall must, as a rule, reach 1:20; slighter grades are allowed only on guarantee of abundant flushing and by special permission.

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* These flap-valves can be screwed down securely, and not left to chance, like the "wooden plugs," for instance, used in Boston. They are accessible by being put in the man-holes.

11. Cisterns for rain-water* are to be made with overflows which must dip below the surface of the water and be also secured by siphon-traps.

12. Kitchen and other sinks are to be carefully trapped by iron or lead siphons, before entering the drain. All entering pipes must be smaller than the siphons, and be provided with fixed strainers for catching solid matters.

13. It is recommended that the pipes before entering a main drain or soil-pipe be provided with a main trap. This, to be effectual, should be outside the building, and provided with an opening for cleansing, which might be reached by a covered man-hole 0.85 meter wide. These man-holes cannot be put in the public streets without special permission.

14. All traps must have a water-depth of at least 0.07 meter, and, as a rule, must be like the patterns to be seen at the sewer department; if of different form, they must receive special approval. In traps outside of the houses, the water-level must lie at least 1.30 meters below the surface.

15. Complete drainage of the subsoil may be got by common [agricultural] drain-pipes, or in some other effectual way.

16. The ventilation of each system of house-drainage is provided for by rain-water spouts, by special ventilation-pipes, or in other permitted ways. Rain-water spouts can be used for this purpose only when their upper ends on the roofs are not situated near or below windows.

17. No fluid substances from houses, yards, passage-ways, etc., shall be allowed to run into the public streets, but must be carried underground into the sewers after the foregoing rules.

18. Immediately after completion of a house-drainage system, all vaults must be emptied and filled with earth.

19. No old water-closets or soil-pipes can be connected with the sewers until examined and approved in accordance with the rules just given. Old drains, etc., must be made to conform to these rules as nearly as practicable; old soil-pipes, provided they are found in good condition, may be allowed to stand, even if more than 14 centimeters in diameter, or with sides less than 0.6 centimeter thick.

20. Pan-closets must have a water-trap of 7 centimeters, and be capable of such wide opening as to make the bottom of the bowl entirely free; the width of this opening shall not exceed 9 centimeters. Between the pan and the soil-pipe is a siphon-trap, with a depth of at least 5 centimeters of water, and with a clear diameter of 10 centimeters.

21. Earthenware closets [*i. e.*, "hopper-closets"] with siphons of the same or different material, are allowed, after special approval, if there be sufficient water for copious flushing.

22. Special arrangements for factories, hospitals, schools, public halls, etc., require special approval.

23. The connection of any water-closet can be permitted only when the water-supply is sufficient to completely flush all matters through the local drains into the sewers.

24. The vertical soil-pipes of all water-closets, even if small in diameter, must be carried up above the roof and beyond all windows, for the sake of ventilation.

25. No plan of house-drainage shall be approved until the proprietor has furnished evidence that these rules for the disposal of human refuse can be kept, or until others shall have been provided by the sewer department to satisfy their requirements.

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* This, of course, is not used for drinking.

Form of Certificate.

The undersigned, owner of house , No. , petitions the department for permission to drain into the public sewers, in conformity with the accompanying plan, and pledges himself, for himself and heirs,

a. To pay to the department the assessments* which are made upon the proprietors by law or by statute.

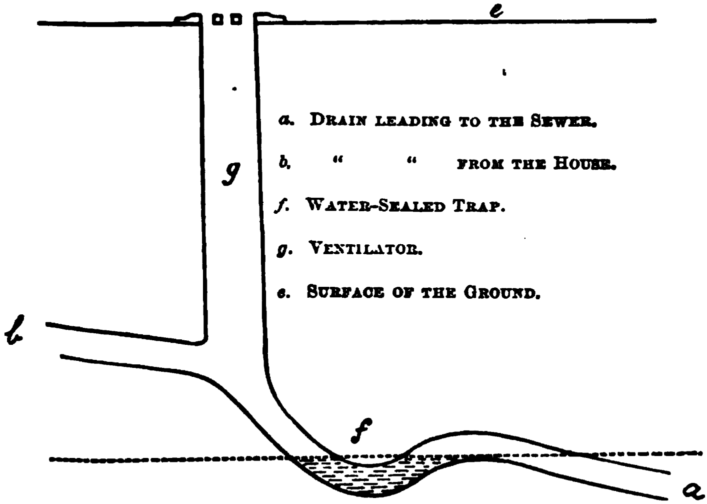
b. To construct the proper works within his house and lot, in conformity with the general and particular specifications of the sewer department.

c. To remove cesspools, vaults, etc., from his lot, according to directions of the sewer department, immediately after completion of the drainage-system.

After the Croydon epidemic, Dr. Buchanan recommended that the sewers be entirely disconnected from the houses by traps, and also by vents, in the manner described in the accompanying cut. (Fig. I.)

If a man-hole were built instead of the small air-passage, ready access to the drain and trap might always be had; and, in our made land, this would supply a common defect by which early knowledge is not now got of the breaking of pipes by settling of the soil.

FIG. I.



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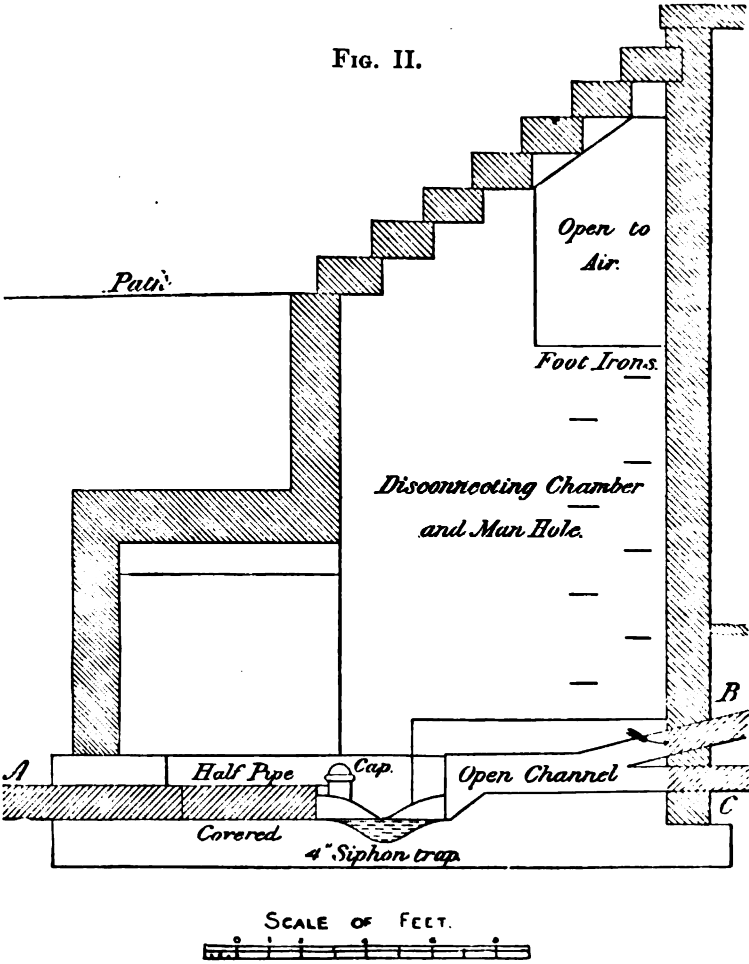
* Or, as we say, "betterments." No one in Frankfort is compelled to adopt the water-carriage system and connect with the sewers; but, if they do so, they must follow the rules. The number of houses for which drainage-systems were completed, was, in 1872, 885; in 1873, 1,345; in 1874, 1,960; in 1875, 2,958.

Figure II. illustrates the same principle as carried out by Mr. Rogers Field of London. In both cases the draught is downward through the ventilator, the air passing out through the soil-pipe over the roof. These ventilating-shafts might not be available for the whole year in our climate, but freezing could easily be prevented by packing in winter.

Fig. II.



A represents the drain leading to the sewer. *B* is the lower end of the soil-pipe. *C* is formed by two drains,—one from the kitchen and flush-tank, and the other an agricultural tile for draining the soil.

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The disconnecting chamber is placed under the stairs passing from the rear door of the house to the garden. The "open channel" (see also Fig. III.) is simply a half of a drain-pipe with its upper part entirely open, and would be represented in cross-section by a letter U. In this way, any sewage-exhalations that pass the syphon-trap are diluted and diffused in the open air, while a nearly constant circulation is produced through the whole length of the soil-pipe and out over the roof. There is no odor perceptible from the open channel.

It should be distinctly understood that carrying the soil-pipe through the roof should never be used as a means of ventilating the sewers; it is simply for ventilating the system of house-drains, soil-pipes, etc.

In Figure III., a detailed ground-plan is shown of Mr. Field's very thorough system of house-drainage.

A represents a double ventilating-shaft, about ten feet high. *B* is the flush-tank* for collecting kitchen-grease, etc. The disconnecting chamber and man-hole are represented on a large scale in Figure II. If it be said that such precautions indicate an excess of care, it should be remembered that many persons are unwilling to leave a stone unturned, especially where there are children or delicate persons, to have the sanitary arrangements of their houses as nearly perfect as possible. Without these, or equally effective measures, it can be hardly considered safe to have wash-bowls, bath-tubs, etc., in direct communication with rooms which are constantly occupied.

Of course, it is not intended that this report should convey the meaning that good sewerage and good house-drainage are the panaceas for all our fevers, etc., etc. But they represent one of the most urgent sanitary needs of many of our cities, public buildings, and residences at the present time. Personal hygiene must indeed supplement laws protecting the public health, but without them, in many cases, no care on the part of individuals can save them from fatal diseases.

Very few States, unfortunately, recognize their responsibility in this matter; but it is to be hoped that the time is not far distant when we can realize the prediction* of Dr. Benjamin Rush, the most noteworthy physician that our country has produced. Many years ago he said that the means of preventing pestilential fevers "are as much under the power of human reason and industry as preventing the evils of lightning and common fire. *I am so satisfied of the truth of this opinion, that I look for a time when our courts of law shall punish cities and villages* for permitting any of the sources of billious and malignant fevers to exist within their jurisdiction."

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* The "flush-tank" has been described by Mr. J. Netten Radcliffe in the Second Report of the Medical Officer of the Privy Council and Local Government Board of England, pp. 230 *et seq.*, and by Colonel Waring in "The Sanitary Drainage of Houses and Towns," pp. 199 *et seq.*

In our large buildings, hospitals, asylums, hotels, etc., there is too often a lamentable deficiency of foresight and care in these respects. The general principle, so admirably carried out by Dr. Cowles in his recent work at the city hospital of Boston, to keep soil-pipes, water-pipes, drains, etc., as accessible as possible, where they may be *seen* at any time, cannot be too strongly recommended.

The cost of sanitary improvements, as compared with their value to the community, does not come within the scope of the present paper; but the whole matter has never been better stated than by the Army Sanitary Commission, that "the sooner the idea that stations are unhealthy because they are unhealthy is replaced by the conviction that an unhealthy station represents an annual loss far greater than the cost of improving it, the more certainly will striking differences in local statistics be equalized."

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* **Essay on Summer and Autumnal Diseases.**

SEWERAGE:

ITS ADVANTAGES AND DISADVANTAGES, CONSTRUCTION AND MAINTENANCE.

By E. S. CHESBROUGH,
City Engineer, Chicago, Ill.

SEWERAGE: ITS ADVANTAGES AND DISADVANTAGES, CONSTRUCTION AND MAINTENANCE.

Before determining what plan or system of sewerage, if any, should be adopted for a city or populous district, the question should be asked, and, in fact, always is asked by the tax-payers, of what benefit would the system be if carried out? To answer this question intelligently requires a knowledge of sanitary laws in general, and of local peculiarities, including topography, population, business, and legislative action, both had and obtainable; also, quite often, of the physical and industrial characteristics of the surrounding territory.

Sanitary laws, in general, include subjects which can be properly investigated and explained only by the medical profession, because the members of it alone have the necessary training and means to do it in a thorough manner. Nevertheless sewerage, as a specialty, is and must be studied and applied by individuals especially qualified. Local peculiarities relative to topography, population, business, etc., can be obtained only on the ground.

The most satisfactory, and generally convincing, arguments in favor of sewerage are those obtained from an experience sufficiently extensive as to time and population. Bills of mortality are appealed to usually, and, with the exception of a few anomalous cases, susceptible either of remedy or satisfactory explanation, show, both for European and American cities, a very favorable result. It cannot reasonably be expected, however, that a city or town whose mortality has been decidedly diminished by the construction of sewers, even when combined with an abundant supply of pure water, should continue to show, decade after decade, diminished death-rates. Just the reverse of this often happens; sometimes from defects in the sewers or their maintenance, or in the house-connections, but oftener from evils connected with the industrial, hygienic, social, or moral habits of the people, or from climatic causes.

Sometimes the character of the population of large district in cities changes greatly in a short time. In such cases, ther may be a large increase in the rate of mortality, without an change whatever in the sewerage system or its maintenanc There may be no change in the population or sewerage, y materials used in the construction of buildings may becom by absorption or decay, deleterious to health. Districts or inally healthy, and still properly cared for by their own lo officers, may be rendered unhealthy by injurious trades occupations outside of their limit, by deterioration and a teration of articles of diet, and by many other causes of inj to health, which might also be mentioned. To eliminate effect of all or any of these from that of sewerage, woul extremely difficult, if not impossible.

Death-rates should not be appealed to alone in referen the benefits of sewerage. Should these remain the sam creased cleanliness and comfort conduce to a higher ord civilization. To fully appreciate this, one must witnes changes made, in densely populated portions of a city the old privy and cesspool system to that of modern sew accompanied with an ample supply of water. Any s attempt to compel such communities to return to th methods of disposing of refuse would be met wit determined opposition, notwithstanding the views o men, eminent for scientific and other attainments, w demn the whole system of modern sewerage, especiall closets and the removal of excreta by water-carriage their objections have force, cannot be denied ; but the d is, that they have never been able to devise and ca for densely populated districts, anything better tha good as, what they condemn, in a climate like tha northern portion of the United States.

Whether modern sewerage should be applied to densely populated districts may very properly be qu So long as the ordinary dwellings of a district are wi arated from each other, or clustered in small village is practicable to preserve and promote the public he out public sewers by removing all refuse, before fer or putrefaction, to the land, and there using it as a fertilizer. Unfortunately this is not done in many cases, but piles of filth on the surface are allowed to accumulate and corrupt the air; or leaking cesspool after cesspool may be sunk into the ground and pollute the wells, engendering debilitating and often fatal diseases. But it would be superfluous to add to what has been said already under so many heads, particularly in the last annual report of the State Board of Health.*

Could the future of towns and cities be foreseen from their commencement, much might be done in laying them out to facilitate their proper sewerage; but actual experience shows that sites selected for large cities have, in the end, very seldom been so occupied.† Any attempt to introduce into a small town a system of sewerage that would be adapted, as far as it went, to the wants of a large city, might be an intolerable burden. The question, then, of adopting such a system must be left, as a rule, until the necessity for it becomes manifest.

When the necessity for sewerage in any district has become evident, the authorities should appoint, from among their highest representative men, a commission to investigate the matter with the aid of the best engineering and other talent they may be able to procure, and prepare a plan to recommend for adoption. There may be, and are, cases where populous districts suffer greatly for the want of proper sewerage and sanitary arrangements, and yet the fear of taxation or unreasonable prejudices will oppose the carrying out of such measures. To meet such cases there must be an exercise of the power of the State, either through a board of health or some other duly authorized body. The plan recommended should be publicly discussed, so that the community may have sufficient opportunity to point out its defects, if any exist. When perfected, it should be given either to the commission first appointed, or to another like it, with full powers to carry it out. The commission should be appointed for a term of years sufficient to complete the work, as far as needed at the time, and not be subject to change by the city council or public election during that term, except for incompetency or dishonesty. The plan, after being partly carried out, ought not to be so changed or modified as to impair its efficiency, which might happen, if new men should be placed in charge of it. Nothing is more disastrous to public works than making them subject to the control of political partisanship, so liable to be associated with municipal venality. Cases could be mentioned where millions have been squandered, appropriations exhausted, and the people obliged to do without much-needed improvements, for the completion of which they had already been taxed enough, or were loaded with bonded obligations more than sufficient.

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* See pp. 184–190, and also p. 535 (Beverly), p. 539 (Hadley), and p. 542 (Newton Lower Falls).

† The report of the Sanitary Commission of Massachusetts for 1850, p. 153, contains the following: "We recommend that, in laying out new towns and villages, and in extending those already laid out, ample provision be made for a supply, in purity and abundance, of light, air, and water; for drainage and sewerage, for paving, and for cleanliness."

The proper organization of the body, by whatever name it may be called, for carrying out sanitary works, is of vital importance to their success. Parsimony in this connection may prove almost, if not quite, as fatal as dishonesty. Inferior commissioners or engineers are likely to prove very costly in the end, however small their nominal salaries may be.

Supposing the organization under which the works are to be planned and carried out is what it should be, it would seem almost useless to point out further how the sewers should be planned and built, or attempt to give complete rules for every case that might occur. As in really or supposed dangerous attacks of illness, non-professional people do not begin to consult books, or send their neighbors to inquire of those who have had apparently similar diseases, but rather send in haste for an experienced physician, whose education and practice qualify him to say what should be done; so should cities and towns, through a judiciously appointed commission, employ thoroughly trained and experienced sanitary engineers, wherever they may find them, at home or elsewhere, and not attempt to get the necessary knowledge by simply consulting books or sending out committees to visit other places. This is all very well, as far as it goes, but a fatal mistake may be made by going no farther. Such committees sometimes return, feeling confident that they know how to plan and carry out such works without further professional aid, but the community finds out after a few years that it has been educating men at a cost vastly greater than that for which thoroughly competent experts could have been employed.

With the foregoing caution against committing the responsibility of planning or carrying out sewerage-works to unskilled and untrained hands, the principles and rules that should control such matters will now be taken up.

SURVEYS.

In order to devise a judicious plan of sewerage, it is necessary first of all to know the shape, extent and topographical features of the city to be sewered. To this end careful surveys should be made, including not only the streams, canals, roads, railroads, streets and buildings (in a general way), but the heights of ground above some common base or plane of reference. Where valleys or water-sheds lying outside of the city or town must be drained through it, their shape, extent and topographical features should be known.

Beside this information, it is necessary, in order to estimate the cost of such works, and consequently to plan them wisely, to know the character of the soil as far down as it may be necessary to put the sewers. If the place should not be situated on some stream or large body of water sufficient to neutralize or render innocuous the sewage at once, the surveys should be extended to such natural or artificial outlets as the vicinity may afford. Various plans for meeting this serious difficulty are often presented for the same town; for all of these, surveys should be made.

In obtaining local information for such purposes, the engineer will often be annoyed with ridiculous suggestions, but he should be careful to treat kindly and respectfully those who make them; for, if out of a hundred recommendations, one should be of value, it would repay the trouble of listening to them all. Other things being equal, that engineer who listens respectfully to the suggestions or criticisms of the humblest individual, and profits by them when he can, is the least likely to grieve over serious faults in any part of his work.

PRELIMINARY STUDY.

A thorough survey having been made, the information thus obtained should be shown on a map sufficiently large to make everything plain. On this map should be drawn contou lines; that is, lines showing different levels of the surface o the ground above the common base. For very flat sites th difference of level shown between the different lines shoul be very small,—sometimes not over two feet; sometimes contour line for every ten feet is quite enough.

A knowledge should be had also of the past rate of increa of population, and of the reasons why it should increase at equal, or less, or greater rate in future, together with the dir tion in which that increase is likely to take place, and existing and prospective kinds of industry for which spe sewerage provisions should be made.

The engineer should also know what general or sp legislation bearing on the subject may exist, so that his when perfected, however good in itself, may not have t rejected, in whole or in part, on account of legal objecti

With the above information before him, the engineer b the study of his plan, which should, when carried out tainly accomplish not only the purpose intended, but for the least possible cost consistent with efficienc durability.

As no two cities are alike in all respects, the peculia ures of each one to be provided with sewers must be fully studied and taken advantage of. First of all, the water-courses, or existing drainage, should be interfere as little as possible, except to improve them. These water-courses, which, within the limits of a city, are li become exceedingly offensive and dangerous to he receiving ordinary sewage, can often be used to ca excessive storm-water without any such danger, and th mit a great reduction to be made in the sizes, and conse in the cost, of the principal sewers. The public au should never permit a natural water-course to be so in with, as to materially diminish its flowing capacit temptation to do this is very great, especially where st ravines cross city lots in such a manner as to make it if not impossible, to erect desirable buildings upon the influence of property-holders with city councils in thi is sometimes exerted to a most injurious extent. nately this mischief may be, and has been, done b community have become convinced of the necessity of sewerage.

It often happens, especially in large towns, that sewers have been constructed from time to time in particular localities to meet special wants, without any regard to a general system for the whole municipality, or, in fact, without reference to the natural drainage of the whole of the particular district in which it is made. London in former years presented some striking instances of this kind; but as the Londoners did not know how rapidly their city was to grow, so has it been with smaller communities since. The engineer must study carefully the plan and condition of such existing sewers; and, though he may find none of them such as he would recommend, had the work to be done anew, he may, under all the circumstances of the case, find it not only possible, but advisable, to incorporate a greater or less proportion of them in his general plan. In such matters, there is much room for discretion, and the best of engineers, as well as other experts, may differ as to what should be done. The mere cost is too apt to decide such questions, but should not do so, especially when old sewers have been badly planned or constructed.

The most perplexing problem to be solved is often that of determining upon the position of the outfall of the whole system, partly because this depends also upon the disposal to be made of the sewage. The disposal of sewage having been treated so fully and thoroughly in the last or seventh annual report of the Board, and there being no more recent experience of importance to add, it is not proposed to enter upon any discussion of the subject here. Supposing that, in the light of such information, the method of disposing of the sewage has been determined upon, the course of the main outfall sewer is then to be fixed. Ordinarily this is limited by the character of the ground, and by the streets and other improvements. Sometimes much study is required to choose judiciously between different lines on which careful surveys and estimates have been made.

The course and general character of the main outlet sewer cannot be in all respects satisfactorily arranged, particularly its upper portion, without determining at the same time the leading characteristics of the principal branches and laterals.

In order to fix these, the whole territory embraced by th
plan should be divided into sewerage districts. Sometime
the natural surface of the ground is so marked by ridges an
valleys as to leave no doubt about the limits of these district
In some cases, especially on very flat ground, there will
opportunity of having large or small districts, as circumstanc
may require. If the districts are made very large, in view
future wants, the burden upon the present tax-payers may
intolerable. This will depend very much upon the laws
ordinances governing such matters. If the property-ow
have to pay one-half or two-thirds of the cost of the sewe
their districts, when they are constructed, and if the rem
der must be paid by general tax in the same years, then
burden will be very heavy, especially if large sewers
made with reference to future wants. On the other ha
the present only, or mainly, should be provided for
future may demand such additions as would be diffic
introduce without considerable sacrifice of old work.
saving of interest, however, would in many cases mor
balance this sacrifice.

To illustrate the difference between present and
wants in constantly growing cities, let us suppose one
situated on a large river or water-front, with a very fl
and extending back from the water but a short distanc
such a case, no large sewer need be constructed at first
perhaps for storm-water; but, as the city grows, se
larger and larger outlet will be required, because new t
will be constantly drained into the same outlet. To a
expense of large sewers at first, there may be an arra
in the plan for constructing them afterwards on every
sixth, or other street, by making such street a boun
tween two original districts. By laying pipe-sewers
side of the street, as near as practicable to the
centre of the street might afterwards be occupied b
sewer, which could be constructed without renderin
or even endangering, any of the original work, or
its efficiency. But to provide with certainty for the
the future, requires a prophetic mind possessed by
if any. Still, it is necessary to make the best pr
can, and if those who come after us smile at our fail

will but repeat what we sometimes have occasion to do in reference to our predecessors. Imperfection of results in such cases is generally, if not always, much better than no attempt at all.

If the circumstances of the place should be such as to make pumping necessary, in order to dispose of the whole or a part of the sewage, much may be saved in annual cost of maintenance by intercepting sewers, where the ground admits of them. Such sewers are usually intended to carry off the ordinary daily sewage, and to convey, besides, a small amount of rain-water, say one-quarter of an inch, over the whole territory drained, in twenty-four hours. An excess of storm-water above this is allowed to flow over weirs provided for it on the sides of the intercepting sewer, by the shortest channels, into some natural water-course or sea or lake.

Occasionally, such sewers have to be taken across valleys of greater or less depth, and over or under rivers and canals. These are generally passed by making inverted siphons beneath the beds of the rivers or canals, and, sometimes, on the bottoms of the valleys. Such siphons, when properly constructed, and with ample means of flushing them, have been tried in European cities, and found to work so well that they are now recommended without hesitation.

Where some portions of a city are much higher than others, as in London, one intercepting sewer higher up than another may be introduced to advantage, to save pumping, and, in many cases, to accommodate available sewage-farms, which are likely to be found in different directions and at different heights.

It happens, sometimes, that an intercepting, or other principal sewer will be, in some part of its course, below the bed of a stream or other body of water, into which storm-water cannot be discharged from the sewer, without artificial aid. Advantage may be taken of this for flushing the sewer, and the general plan should be adapted to it if practicable. Instances of this, as well as of all other examples of sewerage, may be found in London, the great repository of information on this subject. The cities of Hamburg and Dantzig give admirable instances of this mode of flushing.

The depth to which it may be necessary to place the sewers, makes a knowledge of the character of the soil very essential,

as already mentioned. Sometimes the most natural lines fo
a sewer, as regards length and depth of cutting, may b
exceedingly expensive, owing to the existence of large bodie
of wet and running sand or of hard rock. Sometimes the rai
road tracks, along the proposed line of the sewer, prove serio
obstacles to its construction, especially where it is not prac
cable to divert the trade and travel temporarily in anoth
direction, and when a suspension of the use of the road,
a few days even, would be ruinous to important interests.
the franchise of the company owning the road should be s
as to entitle it to damages for any interference with the
of their tracks, such interference might be a very ser
matter in the cost of constructing the sewers.

If running sand should be found on a narrow street,
tall and expensive buildings on each side, and if the grad
the sewer extend much below the foundations of the b
ings, there will be great danger of causing the fronts o
buildings to settle and crack. Skill and care may do
much to avoid such results, but skill and care are not a
exercised, even when bargained for in the clearest t
Neither the ablest engineer nor the most capable and e
enced contractor can be everywhere on the work, da
night. Sometimes the carelessness or absence of a for
or the unfaithfulness of a single laborer, will be the ca
very great damage.

The removal of rock, especially of the kinds that
blasting, may be not only very expensive in itself,
cause of serious damage to persons and property, if n
in a very skilful manner. While it is nearly if no
universal to make the contractors, who do such work,
sible for all the damage they cause, no agreement of
can release the corporation from liability to pay su
ages. The contractors, if any, may be compelled
courts to indemnify the corporation, but courts and
not always decide in favor of corporations. These t
said not to discourage the construction of sewers,
they may be essential to the welfare of a place, n
what the nature of the ground may be, but to s
should be taken into account, in the comparison of
plans, or in different modifications of the same plan

WHAT SHOULD BE ADMITTED INTO THE SEWERS.

No rule with regard to this subject is equally applicable in all places; for it would be not only safe, but expedient, to admit more in some than in others. A city with sewers of steep grades and an abundant supply of water for flushing purposes, and situated on a stream of sufficient dimensions and velocity, may admit into its sewers anything ever considered proper and removable by water-carriage. In such cases a great deal of road detritus may be admitted, provided it should not be so heavy as to wear away the bottoms of the sewers. When a city has sewers of slight inclination, with a scant supply of water, and is obliged to pump up the sewage, or otherwise dispose of it with great difficulty, it becomes necessary to admit into them only such substances as are easily held in suspension or dissolved by water. In no case, however, is it desirable or advisable to permit slaughter-, packing-, or rendering-houses, soap factories, distilleries, breweries, gas works, or other establishment to fill the sewers, or cause them to be filled, with noxious gases, to such an extent that no available means of flushing, except in extraordinary cases, could remedy the evil. It might seem ridiculous to say that ashes, cinders, broken crockery, and litter of various kinds should not be emptied into sewers, if actual experience did not show that it is often done, or at least attempted. Fortunately, the choking up of house-drains usually teaches those who try it, that the practice is not only wrong, but very expensive. Street gullies have been often used in this way, but a vigilant police will soon detect the offenders. Waste steam from engines, boilers, etc., should under no circumstances be allowed to pass into public sewers.

It is a matter of great practical importance, to determine what proportion of all the rain that falls should be provided for in the construction of sewers, because the greater this proportion, the larger and consequently the more expensive must the sewers be. In some favorably situated towns of moderate size, it is practicable to exclude storm-water altogether, but as a general rule this is neither practicable nor desirable. It is usual in England, as well as in this country, to make provision for a rainfall of one inch per hour. As, in most cases, one-half, or more, of this will be absorbed by the earth o other surfaces upon which it falls, the practice is to mak the sewers large enough to discharge half an inch of rain together with the greatest amount of sewage per hour.

The above rule with regard to rainfall has been found work very well generally in England and in the Unit States; but it does not suffice for the removal of storm-wat in all cases, because there are sometimes rainfalls in bo countries of more than an inch an hour. The surfaces of so localities also absorb a larger proportion of the rainfall th others. This depends very much upon the character of soil, the undulations of the ground, and the extent of bu ings and pavements. Steep, rocky surfaces absorb very lit and instances are known of heavy rainfalls upon them d enormous damage, where the natural water-courses had filled up, and covered sewers, large enough, according t usual rules, substituted for them.

SOIL-WATER.

The lowering of soil-water is looked upon as of vital i tance in many cities. Where brick sewers are used, generally effected, though the joints of the masonry m laid close with cement. Vitrified-pipe sewers alone produce this effect when the joints are made with ceme the frequent occurrence of man-holes, catch-basins, an cellars leaves little or nothing to be desired. In some where other provisions have been made, they have been unnecessary.

FLOODING CELLARS, ETC.

In order to get rid of the danger of flooding baseme cellars by storm-water, some have recommended th tide-valves for buildings, such as are very common warehouses on the wharves of Boston; but, as such rangement may not be required to act for years, whe is no tide, it is liable to be forgotten and out of rep needed. It is therefore an uncertain remedy.

When the soil is very dry and porous to below the of the sewers, there need be no connections at all between the cellars and the sewers, as is generally the case in the lower portions of Paris, where some of the cellars are lower than the sewers. But, where the foundations of buildings are in naturally wet soil, it is very important to have the means of draining them thoroughly.

Some, as already mentioned, advocate excluding altogether storm-water from the sewers and making it flow off over the surface, just as it did before there were any sewers. But the convenience and comfort of getting rid of street-flooding during storms is so great, especially in extensive flat or low-lying districts, that no satisfactory substitute can be found for it in the long run, should it be attainable. Where sewers are at first made avowedly and intentionally too small to admit any considerable portion of storm-water, subsequent managers may be strongly tempted to introduce, here and there, an inlet from the street surface, which, during ordinary storms, would work no injury. The multiplication of such inlets would soon lead to flooding. Such managers would see their folly; and the policy of making the sewers so small originally would be questioned and regretted.

SIZES OF SEWERS.

Many, perhaps most, sanitary engineers take the ground that it is not wise to make sewers larger than sufficient to carry off a quantity of water per hour equal to half an inch in depth over the whole surface drained, in addition to the greatest flow of sewage for any hour in the day, and that, rather than to go beyond this limit, it is better to pay damages for the flooding of basements and cellars when excessive rainfalls occur. This question cannot be settled satisfactorily for all places by a single rule as is shown by experience, in some districts of our largest cities. The flooding of basements and cellars in one district of a city, or in one part of a given district, may cause much greater damage than in another, depending upon their value, the use made of them, and the difficulty of freeing them from offensiveness caused by the flooding. For these reasons, whenever storm-water is to be admitted into the sewers, their sizes should be determined, not by an arbitrary rule supposed to be applicable ever where, but by a due allowance for all the local circumstanc that bear upon the case.

Some engineers object very strongly to making a sewer a larger than the ordinary rule requires, not only on account the extra expense, but because of diminished efficiency und ordinary conditions; but there is another side to this questio In the first place, the items which usually make up the cost a sewer, such as excavation, bracing, pumping and bailin back-filling, supporting or restoring water- and gas-pipes, a repaving, do not increase in expense at all proportionately the increase in size of the sewer. Some of them are affect very little by it. In the second place, the difference or lo of efficiency in a sewer having an area of cross-section fi per cent. larger than required by the usual rules (take, f instance, two pipes, one sixteen inches in diameter, and t other twenty), would, for ordinary daily flow, be far less th is often supposed,—in fact, of little or no practical importan in most cases. In the third place, it has been found th sewers that are liable to be gorged during storms, necessari have gases expelled from them at such times, unfortunate too often into houses with defective drains.

Though not indispensable, there is an advantage in havi sewers large enough for a man to crawl through convenientl when it becomes necessary to search for unlawful waste water, or discharges into them of forbidden substances. If these considerations be added that of reducing to the small amount the probability of having flooded basements and c lars, it will be seen that the reasons in favor of making sew of liberal size are not to be overlooked. Extremes on t subject, as well as most others, should be avoided. T battle which raged so fiercely from twenty-five to twen years ago, between the advocates and opponents of pi sewers, has ceased. Subsequent experience has brought parties much nearer together, yet the peculiarities of differe places leave room for the exercise of careful discrimination, the application of ordinary rules. If doubt should exist, the chances of error be on the safe side; that is, in favor liberal sizes.

In addition to the rain-water that should be provided f in the sizes of the sewers, it is usual, as before stated, to make allowance for the greatest flow of sewage from houses and all other kinds of buildings during any hour of the day. If the sewers are liberally planned, with reference to carrying off storm-water, especially in a climate like that of Massachusetts, it would be unnecessary to increase their sizes on account of ordinary daily sewage, this being so small compared with the other; but, in determining the sizes of intercepting sewers, or of sewers in a city or town where all or very nearly all the storm-water could be made to pass over the surface of the ground and streets to its natural outlets, the probable amount of daily sewage becomes of great importance. What the future of a city will be in this respect no one can tell. The past and present afford no rule for all places or for the same place in a long succession of years. One city will consume not over twenty gallons of water daily on an average for each inhabitant, another will consume and waste more than one hundred. Something very similar to this may be said of different parts of the same city during the same year, or of the city as a whole during a long course of years. The population per square mile, too, varies in density and character greatly at different times and in different localities. Already the average daily consumption of water by each inhabitant in some cities exceeds one hundred gallons for the whole year; but the use and waste of water in very warm or very cold weather, in northern cities, exceed the annual daily average from thirty-three to fifty per cent.

The daily consumption is supposed to take place, mostly, during ten or twelve hours of daylight; but the enormous waste that must take place, when one hundred gallons and upwards are used daily, goes on by night as well as by day, so that an allowance in determining the sizes of the sewers of twenty gallons of sewage per hour for each inhabitant ought to be abundant for large cities, and extravagant for small ones.

Beside the amount of water or liquid to be admitted to the sewers, it is necessary to fix upon their *inclinations* in order to determine their proper sizes. Ordinarily, the inclinations of the sewers conform to the average surface of the ground, especially when this is nearly uniform in slope for considerable distances. In such cases, any material departure from parallelism with the surface involves great expense. At the same time, it is exceedingly important to give to the sewers inclination sufficient to make them self-cleansing with the ordinary daily sewage flowing through them.

Some caution with regard to the inclinations of sewers, as elements in the estimates of their sizes, though not needed by trained sanitary engineers, is necessary for those who have had little or no experience in such matters. It is not the inclination of the bottoms of the sewers, but that of the surface of the water, that gives velocity to the current. When a sewer is very long, the difference between the bottom and surface inclinations cannot be of much importance; but, when a sewer is short, the bottom inclination may have no relation whatever to its capacity for discharging water; in fact, its bottom may be inclined the wrong way slightly, yet, if it be large and half-full or more, it may discharge a great deal of water. On the other hand, a sewer may have quite a steep inclination and yet have a reversed current for a time, if it empty at low tide only, or considerably below high water in non-tidal rivers. The proper sizes for such sewers require special study, in order that storm-water during flood tide or freshets may not enter basements or cellars. Cities already built on low sites present, in this respect, the greatest difficulties, which frequently cannot be overcome without separating the sewage from excessive storm-water and pumping.

Questions connected with intercepting sewers for low-lying districts, pumping works, reservoirs and their accessories are so numerous and important that it would be impossible to give any adequate idea of them in an article of this kind; in fact, each case that arises in practice has its own peculiarities, and can only be safely treated by one who has a knowledge of civil and mechanical engineering in general, as well as of ordinary sewerage works in particular.

Having determined for any locality the quantity of water or other liquids to be admitted into the sewers, and the inclinations that can be given them, their necessary sizes can easily be estimated by rules laid down for such purposes in standard works on hydraulics.

FORMS OF SEWERS.

As that channel having the least length of side in contact with water (the quantity of water being the same for every case) will have the greatest delivery, it follows that a circular form is the best to give to sewers that are either entirely filled or only half-filled all the time. As these conditions, especially the former, are rarely found in practice, modifications of the circular form are found expedient. For ordinary sewers over eighteen inches in diameter, not affected materially by tide- or back-water, the egg-shape (the small end down) presents advantages over all other forms, because the usual flow of water in them has more nearly a semi-circular section than in others; besides, they are more convenient for men to go through in case of necessity than circular sewers of equal area.

Sewers that are filled with back-water much of the time are often more effective with broad and slightly curved bottoms and straight sides, because they drain larger quantities near their bottoms. Such a form may be desirable, when there is no back-water, and when the bottom of the sewer can be but little below the surface, and the quantity of water and sewage so great that only a broad and nearly flat bottom would answer the purpose. Such a form is very common at the lower ends of London sewers, where it would be impossible to have any other, without raising the surfaces of the streets, and, consequently, doing great damage to adjoining property. In passing under railroads and canals, such a form, with double or triple lines of sewers, sometimes becomes necessary.

MATERIAL AND THICKNESS OF SEWERS.

Wood, iron, stone, brick, pottery-ware, and cement are used, according to circumstances, in the construction of sewers. Wood is not a suitable material where it is exposed to the air for a long time; but, where it is under water most of, or all, the time, or excluded from the air altogether, it will last a great while, and is very economical in most parts of this country. Wooden sewers, however, are only to be recommended when but small appropriations are available, and when something more solid is hoped for in the future. It is difficult to give them the best form of interior surface to discharge water, or to be self-cleansing.

Iron is too costly to be used for the principal material in sewers, except where circumstances would render masonry unsuitable, especially where the sewer must be filled and under some pressure, as in the crossing of valleys and under streams by means of inverted siphons. For bottoms or inverts of sewers, cast-iron has been used at Yonkers, N. Y., in a very economical manner, and is said to be very satisfactory, especially for passing over and through bad ground, where single rows of piling and cap-stringers have proved sufficient for the foundations.

Stone enters largely into the construction of sewers where they require broad foundations and thick side-walls; but, without considerable expense for dressing, it is seldom suitable, in a natural condition, for interior surfaces.

The sewers of Paris are to a great extent built of a very hard, rough stone, and made smooth on their interior surfaces by an excellent quality of cement; but such a mode finds little favor in this country or in England, for the reason that excellent bricks are to be had in almost every town at moderate prices as compared with dressed-stone work.

Bricks, when properly made and burnt, cannot be surpassed by any other material of equal or less cost for the construction of sewers of two feet in diameter and upwards. Great care should be exercised in the selection of them, as none but those made of well-pugged clay, having a proper mixture of sand and very hard burnt, are fit for sewers. Arch- or wedge-shaped bricks are very desirable in many cases, but they are not indispensable, when good cement can be obtained. The smoother and more uniform the surfaces of bricks are, the better for the interior surfaces of sewers. Other things being equal, the less water a brick will absorb, and the denser it is, the better.

Vitrified clay, or stoneware, is now very largely and successfully used, not only for pipe-sewers, but for the inverts of brick ones in troublesome soils. At first, serious errors were committed in its use, so that pipe-sewers often failed; but now the requisites of quality and strength are so well understood that failures very rarely, if ever, occur, when proper skill and care are exercised. A great practical difficulty is that of making them perfectly true in shape; but, by selecting those that vary only slightly and similarly from the exact form, and placing them together in corresponding positions, all objectionable irregularities on the interior surfaces may be avoided.

Stoneware inverts are useful for the bottoms of sewers, because they present smooth surfaces to the ordinary flow of sewage, and because the openings in them afford channels for running water, the presence of which would otherwise prevent proper hardening of the cement and make it very difficult to obtain smooth and tight joints.

Cement, beside being used so universally in the construction of brick and stone sewers, is very largely used with sand or sand and gravel, in the manufacture of pipes. In most parts of this country, they can be afforded at a less price than burnt-clay pipes, and, when made skilfully and honestly, have given satisfaction; but the difficulty of obtaining honest workmanship in cement pipes is much greater than it is in the case of vitrified clay. In Milwaukee, broken slag is said to have proved very valuable in the manufacture of pipe-sewers.

Acids which do not attack the burnt clay sometimes ruin cement sewers. If those must be used, let them be made of Portland cement, the manufacture of which has already been satisfactorily established in this country at a price much lower than that of the imported article.

The proper thickness of sewers depends not only upon their sizes and forms, but upon their depths below the surface, and upon the kinds of soil in which they may be built. It is necessary, also, to give sewers, whose tops are near the surface of the streets or roads, extra thickness, or some other protection, lest they be crushed in by the passage of heavy loads over them. Except where it is unavoidable, sewers should never be placed within the reach of frost.

Usually, the work of excavating for sewers, putting them in place, and restoring the surface to as good condition as before, is very simple; but, where deep cuts are required in bad ground, and there are large water- or gas-pipes, and perhaps old sewers and house-drains that must be maintained in use all the time that the work is going on, great care and skill are required. If, at the same time, the streets should b narrow, and if important buildings be situated on them, th danger of doing serious damage will be great. For such work it would be exceedingly unwise, if not criminal, to employ an but skilled persons with actual experience in similar operations. Bracing and sheeting in two or more tiers may b required, and very few contractors or workmen understan such work.

In order to prevent the settling and perhaps ruin of buildings, and sometimes to render the completion of the work itsel practicable, it is necessary, when the soil consists largely o wet, running sand, to sink small wells or shafts below th level of the sewer, and then lower the level of the soil-wate by pumping, in such a gradual manner as not to bring u much sand with the water. This takes time,—it may be onl a few weeks, it may be several months. Without this precaution, the proper construction of the sewer may be ver difficult, if not impracticable. An error or oversight in operations of this kind may cause the sides of the excavation t cave or run in, to the serious damage of property, and perhap with loss of life.

Depth of Sewers.

No rule, adapted to all cases, can be laid down for fixin the depth of sewers. Where the object in view includes no only the removal of kitchen and other waste liquids fro houses, but of soil-water from below their foundations, it i very evident that the bottoms of the sewers must be lowe than the bottoms of the foundation. They should also b low enough to permit branches to enter them at such an elevation above their bottoms as not to be subject to back-wate and deposits in consequence. If practicable, the house-drai junctions should be nearly or quite as high as the centres of th sewers; but this is not an absolute necessity when importan reasons make a departure from the rule desirable. It woul be better to lower the junction to within six or eight inche of the bottom of the sewer, than to lose an opportunity o thoroughly draining the foundations of a house.

In parts of some cities, the requirements of business and o subsoil drainage render it necessary to place the house-drain fifteen feet or more below the surface of the street; in other parts of the same cities, a depth of six or seven feet would be quite sufficient. Where practicable, the bottoms of the sewers should be not less than thirteen feet below the pavements, because the future may and probably will require deeper drainage than the present.

DOUBLE SYSTEM OF SEWERS.

Nearly thirty years ago a double system of sewers was proposed in England, the object being to keep ordinary sewage separate from storm-water. Of course, for ordinary sewage alone, much smaller sewers would be required than those necessary for storm-water; and, in cases where it might be necessary to pump their contents, a considerable annual saving could thus be effected, while the value of the sewage for fertilizing purposes would be much better preserved. Such a system has very seldom been carried out in Europe, and not at all in this country; the objection being not only to the expense, but to the complication. If, in the future advance of sanitary science, it should become evident that a double system is demanded generally, or for any city in particular, the previous existence of an ordinary system need not prevent the introduction of the other, although it would then be more difficult and expensive to arrange some of the details, than if both were planned in connection.

ACCESS TO SEWERS.

However skilfully and carefully sewers may be planned and constructed, they are liable, from various causes, to get out of order or repair; provision should therefore be made for entering and examining them. It is quite common in England and on the continent of Europe to have entrances from the sidewalks, in order to avoid interfering with heavy traffic on narrow streets, but most of their entrances are like those adopted in this country; that is, man-holes placed immediately over the tops of the sewers and opening into the streets. They are provided with covers at the surface of the streets, and often with permanent ladders inside,—a necessary arrangement, when the man holes are unusually deep. When sewers are large enough for men to walk through them, man-holes are not needed so frequently, and only at ordinary stree crossings; but, on the lines of pipe and small brick sewers they should not be more than from one hundred and twenty-five to one hundred and fifty feet apart. In England, lamp-holes are sometimes placed along the lines of small sewers, a changes of direction between the man-holes. They are mad just large enough to admit a lantern, which may be seen fron the nearest man-hole on either side. In this country, however, lamp-holes do not appear to be used, but man-holes though more expensive, take their place. Within a few years contrivances for introducing lights with reflectors into sewer and shoving them through from man-hole to man-hole o jointed rods render it practicable not only to examine th interior of sewers, but to get the exact position of any objec discovered. Such contrivances are especially valuable fo detecting the wrong use made of house-drains or the unlawfu waste of water.

Branches and Junctions.

Branch sewers should always be curved toward the mains and enter them at angles of not more than forty degrees witl the direction of the current in the main sewer. The sam rule holds good with regard to junctions of house-drains witl main and branch sewers. Sewers originally having house-drains entering at right angles—and thus rendered so inefficient during heavy rain-storms as to cause flooding of basements and cellars—have been found abundant in capacit after replacing the square junctions with curved ones enterin at proper angles.

House-Drainage.

It is unnecessary to add to the very full and able article o this subject by Mr. E. S. Philbrick, published in the last annua report of the Board, although the subject is inseparably connected with that of sewerage. Mr. Philbrick very judiciousl states that arrangements which work well in England may no be adapted to the northern portion of this country, with climate so different; and yet some are apt to think that whatever is recommended after long experience in England ough to be proper here.

Much is said by some engineers against laying drains under buildings, and, if it can be avoided, it certainly should be done; but this is not always practicable, unless the streets and alleys, as well as building lots of a city, have been laid out in a suitable way. Even then it is impossible to supply buildings of much depth with modern conveniences without drains of some kind either under or through the basements, the latter being much the more objectionable. In no case, however, should one common drain be allowed to pass under several adjoining buildings, even if owned by the same persons. In such cases, the carelessness of one occupant may greatly annoy all the rest. This may happen where a drain is laid through several private lots in the rear of buildings.

Supply of Water.

Sewers well adapted for the removal of fecal matter and other refuse would only be a curse, if they had not a sufficient supply of water to carry those matters without stoppage to the outfalls, or, at least, to cover by a constant current deposits that might take place, and which must be removed from time to time, by flushing, by machinery, or by hand. It is understood, of course, that in a perfect system of sewers, deposits will not take place, but in practice, owing to peculiar local circumstance, perfection is not always attainable. Even sewers constructed simply for the removal of storm-water from the surfaces of streets, houses, and lots, and from which all house and manufacturing refuse is strictly excluded by law, have become exceedingly offensive in seasons of protracted drought, owing to putrescible substances that enter them from street surfaces,—a difficulty which no care can wholly prevent.

An abundant water-supply is not only essential to the proper working of the sewers, but sewers become necessary when there is an abundant water-supply. In fact, the two are just as indispensable in a perfect sanitary system as veins and arteries are in the human body.

Flushing.

Some writers on sewerage contend that sewers should be so planned as to be kept always free from deposit by the ordinary flow of sewage through them, and, if unexpected deposi should be formed, they will be removed by occasional hea storms. The standard held up by such writers is the corre one wherever it is practicable to conform to it, but there a situations where this is not the case and yet where sewers some kind are indispensable. It should be remembered this connection that there is a very wide difference betwe sewers that have but slight deposits in them, inoffensi because covered with a constant current of water, and tho which may be justly termed "elongated cesspools" reeki with deadly vapors.

There can be no doubt that a sufficient current of wat through sewers will render innocuous slight deposits on the bottoms. On the other hand, a sewer with all the inclinati required by the safest rules, without this supply, will becon offensive. We cannot be certain that everybody or eve neighborhood will use or waste the quantity of water requisi to make sewers "self-cleansing," as it is termed, in contradi tinction from occasional or periodical flushing or cleansing other artificial means. Heavy rain-storms may occur at su irregular and long intervals as not to prevent offensive depo its in some sewers with good inclinations.

In order to produce the greatest effect in flushing sewe with a moderate amount of water, it should be done su denly with as great force as is possible without the ri of flooding basements or cellars. Various expedients ha been devised for this purpose, among the most efficient which are fixed reservoirs at the upper ends of sewers, a portable tanks holding fifty barrels or more. The latter c be filled from fire hydrants and poured into man-holes, whi must be provided with temporary dams (simple boards buckets often answering the purpose), to prevent the wat from escaping in the wrong direction. This method is ve efficient for removing light or soft deposits from sewers two feet or less in diameter, but, for larger ones, it will necessary to provide larger supplies of water, by letting in either from streams or from basins, where this can be don or to insert flushing-gates at different intervals according the inclinations of the sewers, by means of which the sewa itself can be dammed up for a while and then suddenly l loose. When hard deposits are suffered to form on the bottoms of the sewers, it is generally necessary to remove them either by hand or machinery.

VENTILATION OF SEWERS.

The importance of removing bad air from the sewers cannot be overestimated, but the methods proposed for effecting it are various, owing partly to differences of circumstances and partly to discordant views. The unpleasantness as well as unhealthfulness of sewer-gases generally has often led to attempts to prevent their escape at either end of the sewer, or between, nobody wishing to have them on or near his premises. The consequence has been their escape into houses and at other objectionable points, for they will escape somewhere, no practicable device yet having been made to prevent it and at the same time to permit the sewers and drains to be used.

This question leads to the discussion not only of expedients for the removal of gases from sewers, but also of the best methods of rendering those gases innocuous. While it is possible to purify bad air to a limited extent, by means of absorbents or substances that will form new and harmless combinations, it is evident that the great purifier, upon which all must depend, is the atmosphere itself, just as the sea is the great purifier of the waters that flow into it,—with this important difference, however, that, while the sea or any large body of water is inaccessible for sanitary purposes to many populous districts, the atmosphere is everywhere pressing upon us, on all sides.

The English have done more than all others to work out the problem of sewer-ventilation. Without attempting to describe the numerous devices, patented and unpatented, for this purpose, it may be said safely that the result of past experience proves that the more freely air is allowed to escape from the sewers from all points, except the interior of houses and other buildings occupied by men, the better it will be for the public health. If not only from every tall chimney, but from every house-top, aided by the heat of kitchen fires, there were escapes for sewer-gases, and at the same time there were frequent openings from the sewers into the streets for the free entrance and exit of air, there would be little or no complaint of the nuisances now so common In such a state of things, there would be, frequently, if no most of the time, currents of air from the streets into th sewers, and consequently far less offensive gases escapin from the tops of houses and other places. If a large amoun of ordure could be scattered in minute quantities over a extensive field, though it might be perceptible for a sho time to the senses, it would soon become inoffensive; but, i it should be piled up in one spot near a building, it woul not only remain offensive for a long time, but would becom positively dangerous. Such cases are too well known already

In our northern climate, it would be difficult, though no impracticable, to keep street openings, which must be pro tected by gratings or perforated covers, free from obstruc tions, such as ice or frozen earth; but the object in vie would justify the necessary trouble.

CONTRACTS, SPECIFICATIONS, AND INSPECTION.

Considering the common danger there is of the misuse public funds and of the difficulty in preventing it, the contra system of executing public works will, no doubt, continue be generally adopted. In some cases, public interest requir a departure from it, but, on the whole, it will be found th most economical. Exceptions to this rule are work which, not well done, might prove highly injurious to the usefulne of the sewers, and work of such a doubtful character, regards difficulties to be overcome, that no responsible co tractor would be willing to take it without charging exce sively for the risk.

The contract system requires constant and immediate supe vision by inspectors, under the direction of the engineer an his assistants. Great care must be taken to select inspecto not only competent but honest; otherwise, they will be wor than useless. Contractors sometimes pay inspectors mo than their legitimate employers do, and, of course, expect make money by the operation, to the injury of the wor When inspectors are appointed to reward them for politic services, they are very apt to prove either inefficient or di honest, though honorable exceptions are met with.

In order to reduce the dangers of the contract system much as possible, the custom of purchasing brick from one party, cement from another, pipes from another, etc., thus removing from the contractor for building the sewers all temptation to use improper materials, has been adopted in Providence with very satisfactory results. To a more limited extent this system has been adopted in other cities.

In the drawing up of contracts, great pains should be taken to provide for every possible contingency, as well as all positively known requirements, and, if possible, in language not to be misunderstood. This course is the only one to prevent lawsuits or long and sometimes vexatious proceedings in connection with final settlements. It will always be prudent to examine forms of contract and specifications found to answer well after long experience in other cities, and to select from them such portions as may be applicable to the case in hand.

Engineers are often exceedingly hurried in the preparation of plans and specifications, because the commissioners or other authorities insist upon a very early commencement of the work, supposing that an engineer is, or ought to be, capable of drawing up contracts and specifications with the greatest rapidity. The actual time required depends upon the character of the work, ranging from a few days in some cases to many months in others.

MAINTENANCE OF SEWERS.

Sewers require looking after when in actual use. The immediate care of them should be given to some one trained to such work, or at least familiar with those he has charge of. He should be assisted by men also familiar with the work. Usually, a peculiar fitness for such services on the part of some men is developed during the construction of the sewers. When such men have been tried and found faithful, they should be retained permanently,—at least not changed every time the political complexion of the city government may change. It is much to be regretted that the English system with regard to such matters could not be introduced into this country. There, such officials are retained for life or during good behavior; and, if incapacitated for duty by old age or other infirmity, after long and faithful service, they are retired upon pensions. They are not allowed to be partisans in po itics, or even to vote; a very different state of things fro that which exists in some of the cities in this country, whe such officials are required to vote for and contribute money help elect men they may despise, under threats of losing the positions if they do otherwise.

RECORDS.

It is of the greatest importance to have records of ever thing done in connection with the sewers. Plans and sectio of all parts of the work should be carefully arranged in co venient volumes or drawers, and on them should be found n only the position and size of every main and branch sewe but of every catch-basin or other inlet, man-hole, drain jun tion, and tide- and flushing-gates, if any. It may prove great service to be able to refer at any time to the exact da of the completion of any part of the work, the parties w did it, and the cost. Such information is usually quite acce sible at first, but not always so when a few years have pass away. Inspectors' reports, which are usually made out printed forms, and journals containing accounts of daily pr ceedings and occurrences in connection with the work ma not only prove of much interest, but be of great importan in case of lawsuits, and in determining the durability of som kinds of material.

DISADVANTAGES CONSIDERED.

There can be no doubt but that some evils have occurred connection with sewers, so that cities or parts of cities can pointed out which were freer from certain diseases, especial typhoid fever, before having sewerage works than afte This is not the common result; the opposite can be co fidently affirmed. Modern medical science has made gre progress in discovering the causes of the origin and spread disease, and seems to be on the point of making still great advances. The engineer, on becoming acquainted with t results thus obtained, is deeply impressed with the limit though essential part sewers have to do with the health cities.

Sanitary science is too vast in all its bearings to be limit to brick and mortar or ponderable substances of any kind, and can only be built up and successfully applied by the coöperation of all the professions that study its different branches.

If an occasional outbreak of disease can be traced to sewers, some defect or neglect will generally be discovered in connection with them; but, if not so always, it still remains that sewers, like all other channels which convey good, are capable of transmitting evil,—like the nerves of the human system, which are of greater benefit than can be imagined in health, and even in sickness, but may be sources of intense agony in case of injury or disease.

THE SANITARY CONDITION OF LYNN.

By J. G. PINKHAM, M. D.,
Correspondent of the Board for the City of Lynn.

I.—Natural Conditions affecting Health.
II.—The Population.
III.—Artificial Conditions affecting Health.
IV.—Rates of Mortality.
V.—Prevailing Diseases.
VI.—Health of Different Districts and Streets.
VII.—Concluding Remarks.

THE SANITARY CONDITION OF LYNN.

I.—NATURAL CONDITIONS AFFECTING HEALTH.*

Situation.—Lynn is situated on the northerly shore of assachusetts Bay, in latitude 42° 27′ 51″ north, and in ngitude 70° 57′ 27″ west from Greenwich.

Topography.—The surface of the land is varied, but may described in general terms as a plain bordering the sea,

On page 204, line 13 of the table, for 1.2 read 2.2.
On page 216, line 13, for 1866 read 1865.

lain rises, also, as it approaches the line of hills. In the esterly section of the town this rise is very gradual; in the ntral portion, it is decided; further east, it becomes again ss marked. The slopes are nowhere uniform, but are roken by moderate elevations and depressions from the general line of ascent or descent. In the easterly portion of ynn is a great valley, geologically speaking, of which the alley of Stacey's Brook forms a part. It extends through a ide gap in the range of hills, and far inland; being occuied, within the limits of the city, by a chain of lakes with eir connections, and the two outlying villages of Glenmere nd Wyoma.

To the southward of Lynn is Nahant, a "peninsular island" onnected with the mainland by a long, narrow isthmus, on one side of which are Long Beach and Nahant Bay, and on the other Lynn Harbor, a shallow body of water extending westward to the marshes and Revere Beach. The bottom of the harbor is nearly bare at low water, only the few channels by which it is rendered navigable remaining covered.

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* Under this head are given only those facts which are thought to have at least a neral bearing upon the healthfulness of the region. Some portions, which are erely descriptive, are necessary for a complete understanding of what follows.

The hills in the rear of the city are rough, lightly wooded where they have not been cleared, and of moderate elevation. They are only to a limited extent inhabited. The most southerly of them is High Rock, a naked bluff, 188 feet in height, almost perpendicular on its seaward or southern side, but sloping away gradually on the north. Further inland is Pine Hill, the highest of the series, being 230 feet above the level of the sea. The distributing reservoir of the city water works is on this hill.

Fresh Waters.—The "Lakes of Lynn" are situated in the north-easterly section of the city. Of these, the largest is Flax Pond, or Wenuchus Lake, a beautiful sheet of water some seventy-five acres in extent. Its outlet is Strawberry Brook, which flows southward through a gap in the hills, and empties into Saugus River. Connected with this pond, a short distance further inland, is Sluice Pond, which has steep, gravelly banks, and is very deep. Still further inland is Cedar, or Spruce, Pond. Spring Pond, to the north-east of the last, is partly in Lynn and partly in Salem. Floating-Bridge Pond lies to the east of Flax Pond, in the same great valley. Its outlet is Stacey's Brook, which also receives the overflow of Bog Meadow, through which it flows, emptying finally into the ocean near the line of the town of Swampscott. Silver Lake, situated in a hollow in the rear of the large school-house on Essex Street, is very small, and has no outlet, but is noticeable for its exceeding foulness. Goldfish Pond occupies another undrained hollow in the course of Fayette Street. Saugus River forms the western boundary of Lynn for a short distance. It is here, however, rather a salt-water estuary, or creek, into which the river empties, than the river itself. Its course through the marshes is winding and sluggish. Stony Brook flows from the hills in the west, and joins with Strawberry Brook at the foot of Tower Hill. Beaver Brook receives quite a large branch from the north, called Birch Brook, and empties into Saugus River at the old stone factory.

The waters of all these ponds and brooks are naturally clear and sparkling. Chemical analysis, moreover, has shown that, when uncontaminated by sewage, they are pure, and of excellent quality for domestic use, containing no hurtful mineral constituents, and but a moderate amount of organic matter.

Accompanying this Report is a map, which, in connection with other things, shows all the topographical features of the country, as they have been described. It explains itself sufficiently. What is to be said hereafter in regard to the natural drainage of the region, will be rendered intelligible by a reference to this map. The elevations of the land above the level of the sea (low water) are indicated in Arabic figures. The difference between the high and low water marks is reckoned at ten feet.

Soil.—This term is here used as synonymous with loam or surface-soil. The soil of the highlands is thin and gravelly, non-retentive of moisture, and naturally sterile. It may be considered a warm, dry soil. The marshes and bogs are covered to a great depth with muck or peat, wet at all seasons of the year. This is a cold soil, having but little power, relatively, of retaining the heat received from the sun's rays. On the arable lands which border the marshes at West Lynn, is a deep and very productive vegetable loam. It retains moisture well, and is somewhat warmer than the soil of the undrained marsh. Elsewhere in the city the soil is intermediate in character between the gravelly loam of the highlands and that last described. In most places it contains a considerable amount of vegetable matter, and is sufficiently retentive of moisture to be productive. The amount of moisture actually present in it depends much upon the subsoil, and is very variable in different sections.

Subsoil.—The subsoil of the highlands, where any exists, is coarse gravel. On all the level portions of the city, clay has been found with such uniformity, wherever excavations have been made, as to suggest the probability of a continuous stratum. The depth of the clay beneath the surface varies greatly. In some places it comes up nearly or quite to the loam, as on Holyoke and Harbor streets. In other places the stratum dips down, forming basins and valleys of varying shape and extent. Between the clay and the loam are ranged strata of fine and coarse gravel and sand, mixed with bowlders. The gravel and sand are very loose, and readily permeable by water. We can easily account for the undulating and irregular character of the clay stratum, by supposing it to have been deposited as a sediment in comparatively quiet waters, taking the shape of the bottom, its surface being afterwards acted upon, worn away here and piled up there, by the same agencies that covered it so variously with the products of the drift period. The depth of the clay beneath the surface, so far as it has been ascertained, is indicated on the map in Roman numerals.

Rocks.—The foundation rock of the greater portion of Lynn is porphyritic felsite. It crops out and manifests its character in many places; notably at Red Rock on the coast, at High Rock, and all along the seaboard line of hills. It is very compact, but presents, nevertheless, many seams and fissures for the percolation of water. Mr. J. M. Rowell of this city, who has carefully studied the geology of the region, says that, so far as the rock has been penetrated, it shows evidence of the recent action of water, in the occurrence of dendritic oxide of manganese, which he considers due to that cause. Prof. T. Sterry Hunt says, "The porphyry of Lynn is a stratified crystalline rock, belonging to the Huronian series." This places it well down among the rocks now styled Eozoic or Archæan.

The northern part of Lynn is in the region of hornblendic granite.

Natural Drainage.—As the amount of moisture in the earth of any locality is largely influenced by its natural drainage, this subject becomes an important one in its bearing upon healthfulness, and demands careful consideration. Natural surface-drainage depends mainly on the slope of the land; natural underdrainage on the nature and disposition of the subsoil. Bearing this fact in mind, in connection with what has already been said, we shall readily see that the extensive, low-lying portion of Lynn, which has been called the "plain," with its moderate and varying slopes and irregular substratum of clay, is likely to present some sections that are imperfectly drained by nature. This is found, on examination, to be the case. The rise from the water and the flats to the hills is, in many places, so gradual, that a slight interruption in the ascent creates a break in the surface-drainage, which causes the soil to be wet much of the time; and when coincident with a basin-shaped disposition of the impermeable substratum, leads to the formation either of an open pond or of a bog in which the line of soil-saturation comes nearly, or quite, to the surface. "Bog Meadow" is a conspicuous illustration of the latter. So, also, are the bogs which once existed on each side of Franklin Street. They are now drained, and the land is mostly occupied by dwellings. The overflow of the bogs formerly made two brooks; one of which flowed into the "Frog Pond," on the Common, thence southward to the marsh; and the other along the course of Johnson Street to Munroe, where it joined a similar brook coming from the hills in the direction of Union and Ireson streets. The two together entered the mill-pond.

In the west are long stretches of wet lands along the lower course of the Strawberry and Stony brooks; and on Holyoke Street, where the open fields are extensively occupied by brick-yards. Similar lands exist also in the east, about portions of Stacey's Brook and its two branches from the north-east. On all these wet lands the level of the subsoil water is, in rainy seasons, near the surface, and never very far below. This keeps the surface-soil nearly always damp. Other portions of the plain are naturally well drained. This is true of what will be described further on as the "Ocean District." It is also true of the greater portion of the "Common District," which, although quite low-lying and nearly level, yet is protected from dampness by a deep, open subsoil, and good natural underdrainage. Wherever the clay comes to or near the surface, as on Mulberry, Pleasant, Harbor and Beach streets, there the soil is usually wet; more particularly where the land is situated at the foot of the hills.

Wyoma Village forms part of the watershed of Flax and Sluice ponds, and is naturally well drained. The same is true of Glenmere, except that portion which hugs Bog Meadow and the marsh about Floating-Bridge Pond.

Along the foot of the hills, in some places, are springs; and cellars dug into the rock are often wet from this cause.

Of the natural drainage of the highlands and salt-marshes, which present the two extremes of completeness and incompleteness, it is not necessary to speak in detail.

Climate.—Exposed as it is on the south and east to the winds of the sea, and partially protected from land breezes by a range of hills, Lynn must be considered as having an essentially maritime climate. Yet there are two circumstances which conspire to modify the influence of the sea, and to give us here, at times, a drier air, and subject us to more marked and sudden changes of temperature than would at first thought seem probable.

In the first place, the bodies of salt water upon which Lynn is situated, are partially land-locked (see "Topography"), so that only those winds which blow directly from the east come from the great ocean without passing over any portion of the land; and these are not felt equally in all parts of the town.

In the second place, the prevailing winds are westerly, and have the dry character which usually belongs to continental breezes. They are also colder in winter and warmer in summer than the sea breezes. By the expression "prevailing winds," is meant that they blow more than half the time.

Besides, the rainfall of Lynn is, from local causes, less than that of the neighboring regions north and south of it. But it must be remembered that the climate is largely determined by those conditions which pertain to the continent and latitude, local influences only sufficing to modify it. Some of these points will be more fully set forth as we proceed.

No complete record of meteorological changes has ever been made in Lynn, so far as I have been able to ascertain. Mr. J. C. Houghton has, however, for many years, noted the temperature, the direction of the winds, and the general character of the weather; and he has kindly prepared for me a summary of his observations for the past seven years, from which I have derived the general conclusions given below.

His observations were made morning, noon, and night, and an average taken for the day.

Temperature.—Under this head I shall speak of the annual, seasonal, monthly, and diurnal variations.

Annual Variations.—The average temperature of the year is 47.5° F. The difference between the warmest and coldest years of the series is 4.7° F. Ordinarily the variation from year to year is much less than this.

Seasonal Variations.—The average temperature of spring is 42.8° F.; of summer, 69.1°; of autumn, 49.6°; of winter, 27.3°. The mean difference between summer and winter temperature is 41.8°; between winter and spring, 15.5°; between spring and summer, 26.3°; between summer and autumn, 19.5°; between autumn and winter, 22.3°.

Monthly Variations.—Below is given the mean temperature of each month of the year:—

February (coldest),	26.13° F.	October,	51.04° F.
January,	26.92°	May,	55.56°
December,	28.19°	September,	60.93°
March,	32.54°	June,	66.33°
November,	38.28°	August,	69.30°
April,	42.85°	July (warmest),	71.41°

The difference between the warmest and coldest months is, on the average, 45.28° F. Occasionally, January is colder than February; and December has been known to exceed them both in this particular. In the same way August disputes with July its right to the title of the warmest month.

Diurnal Variations.—The highest average temperature noted for one day during the whole period, was 86.6° F., and the lowest 0. It is comparatively rare for the temperature to remain for many hours below zero, or above 90°; but it is not unusual to note a rise or fall of twenty, thirty, or even more degrees in the six hours intervening between the morning and noon and the noon and evening observations. The average of these diurnal variations has not been determined; but it cannot be very high, for many of the days are nearly uniform in temperature throughout, only a moderate rise taking place near noon.

Prevailing Winds.—From the observations of Mr. Houghton, we may safely deduce the generalization, that ou prevailing winds are westerly. But it must be remembered that we are in the region of variable winds; that they ar liable to change several times a day; and that the most w can hope to attain in any statement of this kind is an approximation to the truth. Westerly winds are almost exclusivel prevalent in November, December and January; easterl ones more so in April, May and June. The westerly wind are remarkable for their dry character. The rapidity wit which moisture disappears from the earth in this region, afte a rain-storm has been succeeded by a north-west wind, i often noted. Easterly winds are laden with moisture Sometimes, but rarely, they bring in fogs which envelope th land. Along the coast the diurnal changes are perceptibl whenever the local currents of air are not overborne by som stronger general ones. They are little felt in West Lynn but more decidedly so in the east, where the coast-line trend towards the north, exposing the shore to the breezes of th great sea.

The Weather.—From the observations made, it appear that, on an average, about 54 per cent. of the winter days ar fair; 28 per cent. cloudy; 8 per cent. rainy; and 10 pe cent. snowy. In the spring, 65 per cent. of the days ar fair; 19 per cent. cloudy; 11 per cent. rainy; and 5 per cent snowy. In the summer, 76 per cent. of the days are fair; 1 per cent. cloudy; and 11 per cent. rainy. In the autumn 69 per cent. of the days are fair; 18 per cent. cloudy; 12 pe cent. rainy; and 1 per cent. snowy.

Taking the year together, 66 per cent. of the days are fair 19.5 per cent. are cloudy; 10.5 per cent. are rainy; and per cent. snowy. The terms "fair," "cloudy," etc., are use in a popular sense, and denote the predominant character o the day. We can hardly claim, in this region, that we d not have a good proportion of pleasant weather, nor that th distribution of it is excessively unequal throughout the year The figures above given will probably surprise some wh are wont to consider our climate excessively harsh an disagreeable.

Rainfall.—The fact that our average annual rainfall is les by some inches than that of Boston and the cities north of us, has only recently been discovered. The difference, so far as determined, is shown below:—

YEAR.	Lynn.	Boston.	Salem.	Lowell.
1873, ...	39.458 in.	54.94 in.	40.88 in.	45.05 in.
1874, ...	34.917 in.	41.09 in.	34.89 in.*	41.75 in.
1875, ...	41.847 in.	51.01 in.	51.62 in.	43.63 in.
Average, . .	38.74 in.	49.01 in.	43.68 in.	43.47 in.

The average of Eastern Massachusetts is 42 inches. The explanation of this low rainfall is, perhaps, not easy to give. It has been suggested, that it may be due to the range of hills, but they are too low. Another, and more plausible explanation, is, that summer showers rarely visit us in their fulness. As they advance from the west, they seem to follow the course of the Ipswich and Merrimack rivers on the north, or the Charles and Mystic toward the south, leaving Lynn in the triangle, to receive at most only the edge of a wetting. But whatever the cause of the phenomenon, it cannot be without some effect upon the moisture of air and soil.

Relative Humidity of the Air.—A sufficient number of observations in regard to this point have not yet been taken to warrant any sweeping conclusions. The most striking characteristic thus far noticed, is a tendency to decided changes from moist to dry, and from dry to moist.

In concluding this division of our subject, it may be affirmed that the natural conditions in the midst of which Lynn is placed, are, in the main, favorable to health. The winter cold is not only endurable, but positively invigorating. The summer heat, tempered as it is by the breezes of the sea, is not sufficiently great or prolonged to cause disease, except in coincidence with artificial conditions which affect the human system unfavorably. The dampness of the soil, observed in many sections, is a defect for the most part easily remedied by art. The water of the locality is naturally pure, and the air clear.

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* Eleven months.

II.—The Population.

The population of Lynn, as given by the different st and national census reports since 1849, is shown below :—

1850, ...	14,257	1865, ...	20,
1855, ...	15,713	1870, ...	28,
1860, ...	19,083	1875, ...	32,

Rate of Increase.—From these figures we estimate average annual percentage of increase for the several qu quennial periods, as follows :—

1850 to 1855, ...	1.95	1865 to 1870, ...	
1855 to 1860, ...	3.96	1870 to 1875, ...	
1860 to 1865, ...	1.69		

The general average for the quarter century is 3.35. Fr these percentages we may calculate the population for intermediate year with a reasonable degree of exactitude.*

The low rate of increase from 1860 to 1865 has an obvi cause in the war, which drained the city of its vigorous m and for a time paralyzed its industries. From 1865 to 1 the growth was remarkable. It probably began the y before the census was taken, and continued somewhat bey the census of 1870; but from the nature of the case th facts cannot be shown by figures. The cause of the sud rise in the rate of increase is to be found in the return prosperity of the country at the close of the war, and great stimulus given to the peculiar industries of Lynn, by general introduction of machinery, after the invention of McKay sewing-machine. The population of Lynn va somewhat with the rise and fall of the business tide. I estimated that during a busy season, when the shops are full operation, there are many hundreds, possibly some th sands, more people in the city than during a dull season the same year. These people, attracted to the city by prospect of good wages and plenty of work, fill to overfl ing the boarding-houses, and for a time give a crow appearance to the streets; but when work slackens they back to their country homes, or seek employment in so other place until the ebb-tide is past in Lynn.

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* To estimate the rate of increase, we have employed the usual formula, ded from the well-known principles of geometrical progression.

Sources of Increase.—The rapid increase in the population
Lynn has been largely due to immigration. The birth-rate
low. From 1860 to 1875, the average is but 26.7 per
usand of the population. The average death-rate for the
ne period is 19.5, giving us a difference of 7.2 per thou-
d, or .72 of one per cent. Even if we make a liberal allow-
e for defects in the registration of births, we shall be forced
look to immigration as the main source of supply. The
mestic sources from which Lynn receives its immigration,
chiefly Maine, New Hampshire and Vermont. The towns
Massachusetts largely contribute. The foreign sources,
ned in order of the number of immigrants, are Ireland, the
minion of Canada, and England. A few come from other
ts, as Scotland, Germany, France, etc., but the numbers
so small as to render them of no account in any computa-
ns respecting health.

Nationality.—Of the 32,600 people existing in Lynn in
75, according to the late census, 5,691 were reckoned of
eign birth. This is a percentage to the whole population,
17.4. Of these, 3,344, or 58.7 per cent. of the foreign
n, and 10.2 per cent. of the population, are from Ireland,
85, or 29.6 per cent. of the foreign born, and 5.1 per
t. of the population, are from the Dominion of Canada,
, or 1.3 per cent. of the population, and 7.4 per cent. of
foreign born, are from England. The remaining 4.3 per
t. of the foreign born are from other places.

But this statement does not give a fair idea of the race of
foreign born, inasmuch as many of those from the Domin-
of Canada are of Irish, English and Scotch parentage;
ile many from Canada proper are of French descent, and
so distinct in their characteristics as to form a race by
mselves. The Irish undoubtedly bear a rather larger pro-
tion to the whole population than these figures show.

The census reports do not give the number of children of
eign parents; but by direction of the State Board of
alth, Mr. J. Carruthers of this city made a special enu-
ration from the schedules of the last census, covering
s point, and that of the population by streets. The Board
indebted to the chief of the Census Bureau, Carroll D.
right, Esq., for his kindness in forwarding this work. By

this enumeration it was ascertained that the foreigners their children in Lynn, in 1875, numbered 9,309 ; a percent to the whole population of 28.5, leaving 23,291, or 71.5 cent., to be classed as of native and mixed parentage. former will be called foreigners hereafter, for the sake of c venience, and the latter natives. The two classes will be k distinct, to a certain extent, in computations.

If we suppose that the same ratio between the foreig and their children obtained in 1870 as in 1875 (and this not be far out of the way), the number then existing wo be 8,071. This gives an increase of 1,228 ; an aver annual per cent. of 2.90, a little less than that of the at large. The birth-rate among the foreigners is higher t that among the natives ; but the death-rate is much hig still, so that it is safe to affirm, with respect to Lynn, at le that the foreigners are not increasing as fast as the native

Age-Distribution.—The age-distribution of the popula of Lynn is given below, in several different groupings :—

AGE.	Number.	Per cent. of Population (to tenths).	AGE.	Number.	Per ce Popul (to te
Under 5, . .	3,280	10.0	90 to 100, .	11	0
5 to 10, . .	3,185	9.7	Unknown, .	83	0
10 to 15, . .	2,746	8.4			
15 to 20, . .	3,243	9.9	Under 15, .	9,211	2
20 to 30, . .	6,669	20.4	15 to 60,. .	21,309	6
30 to 40, . .	5,547	16.9	Over 60,. .	1,997	6
40 to 50, . .	3,696	11.3			
50 to 60, . .	2,154	6.6	Under 20, .	12,454	3
60 to 70, . .	1,301	3.9	20 to 50,. .	15,912	4
70 to 80, . .	536	1.6	Over 50,. .	4,151	1
80 to 90, . .	149	0.4			

What strikes us in this statement is the small numb children under five years of age. It is less than that of Bos and of the State at large, by .5 per cent. Another poi be observed is the large number of vigorous adults. compared with the whole State, the number between tw and fifty is 4.2 per cent. larger. It does not differ n from Boston in this respect. Lynn also contains a percentage of people over sixty than the State. Thus we it it has a large relative number of those who are in the gorous, productive ages, and a small relative number of ose who are in the feeble, dependent ages. For this reason ought to have a somewhat lower death-rate than places in iich the opposite conditions obtain.

The Sexes.—Forty-seven per cent. of the population of nn are males; 53 per cent. females. This percentage females is a little greater than that of the State at large, t smaller than that of Lowell, Lawrence, and some other nufacturing towns.

Occupation.—Of the 8,805 persons who are set down in the nsus report as being engaged in manufactures and mechan- l industries in Lynn, 5,689 are employed in some branch shoemaking. These figures are supposed to include the rking men and women alone. No other business requires services of one-tenth part as many persons. The manu- ture of morocco comes nearest to it, employing 456 men; rpentry next to that, with 445. It is therefore obvious that chief employment of the people of Lynn, outside of those nds of labor which pertain to every community, is the manu- ture of boots and shoes. Of the number of operatives ven above, 1,660 are women. The influence of this occupa- n, apart from its frequent, but unnecessary, concomitants badly-drained, -warmed, and -ventilated shops, upon the alth of the operatives, is a subject which requires too much earch to be discussed within the limits of this paper. The ndition of the shops will be briefly considered further on.

Intelligence.—Of the 26,135 above ten years of age, 1,010, ercentage of 3.8, cannot read and write. Of these, 867, 85.8 per cent., are foreign-born. The native population , as a rule, fairly educated. The standard of education in schools is high, and they are well sustained. The per- ntage of illiteracy is less than half that of the State at large, l but little more than a third that of Boston. This general fusion of intelligence is another circumstance tending to the oduction of a relatively low death-rate.

Wealth.—Property is pretty evenly distributed among the ople. The wealthy class are few in number, as compared th many other places. The great body of the people may said to be in moderate, but comfortable, circumstances.

The total valuation, divided, gives $795 for every person, and $2,908 for every adult male.

Pauperism.—During the year 1875, the city maintained fully, at the almshouse and elsewhere, 165 persons, including the insane chargeable to it at Ipswich. It also partially supported 2,219 persons at their own homes. The number thus assisted has been larger for a few years past than formerly, owing to the depression of business. Many receive aid only for a portion of the year. The percentage of complete pauperism to the whole population is 0.5; of partial pauperism, 6.8; total, 7.3.

III.—Artificial Conditions affecting Health.

Water-Supply.—The water-supply of Lynn is derived mainly from two sources; viz., 1. The wells scattered everywhere throughout the city; 2. Two artificial ponds.

Up to the year 1870, the water used came almost wholly from the former source. The rain-water, collected from the roofs of houses and stored in cisterns and hogsheads, was used chiefly for washing and similar purposes, not for drinking or cooking. Now the pond-water is generally supplied to the thickly settled parts of the city; yet there is a widespread preference for the wells, comparatively few of which have been abandoned. It is safe to say that two-thirds of the people habitually use well-water. In view of the fact, which is thought by medical men to be established, that impure water is a common cause, not only of typhoid fever, dysentery, diarrhœa, and similar diseases, but also of many disturbances of health which have no well-defined character or name, it becomes a serious question for the inhabitants of Lynn to consider, to how great an extent these wells have or may become polluted. The subject is treated somewhat in detail on account of its importance.

Wells.—There are three kinds of wells in use:

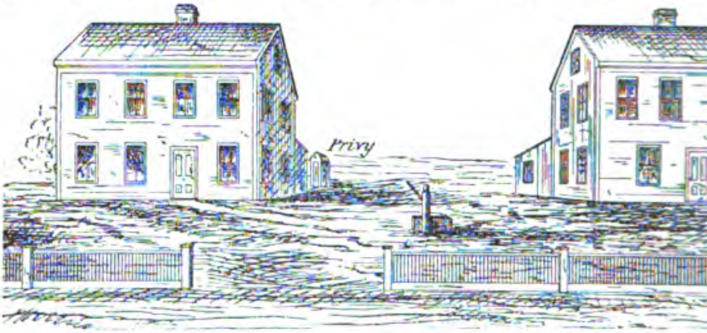
1. The ordinary dug well.
2. Driven wells.
3. Borings; sometimes called artesian wells.

The dug wells are by far the most numerous. Of these, the great majority may be described as superficial. As has been shown before, a large part of inhabited Lynn is situated on an irregular clay bed, covered with loose gravel and sand. It is easy, by digging a short distance in almost any part of the plain, to reach a saturated stratum of earth, overlying the clay. The depth of water in a well sunk into this stratum will vary continually with the season. The water is clear and sparkling, except after heavy rains; but there is nothing to protect it from contamination, when the well is situated in the neighborhood of cesspools, vaults, and filthy refuse heaps, the soakings of which render the earth foul. A portion of the dug wells are sunk below the clay stratum. This may be said to be uniformly the case where the clay comes very near the surface. Another portion of the wells are dug into the rock. These are situated on the hills, or at their foot. The depth of the wells varies from ten to twenty-five or thirty feet. A few go deeper. They are usually stoned up, though some have wooden curbs. Those which are sunk below the clay are less liable to contamination than the others, but they are by no means secure; for leakage may occur above, through the loose wall of the well, unless this is thoroughly backed in with clay or cement,—a precaution seldom taken.

When the clay is near the surface, and the stratum thin, these wells are scarcely better protected than those above the clay; for the neighboring cesspools and privy-vaults are also, quite likely, sunk lower than the clay, and their contents find ready access to the well through the porous substratum. The rock affords no protection, for the water passes freely through its fissures, and does not receive any of the benefit of filtration which is afforded by earth.

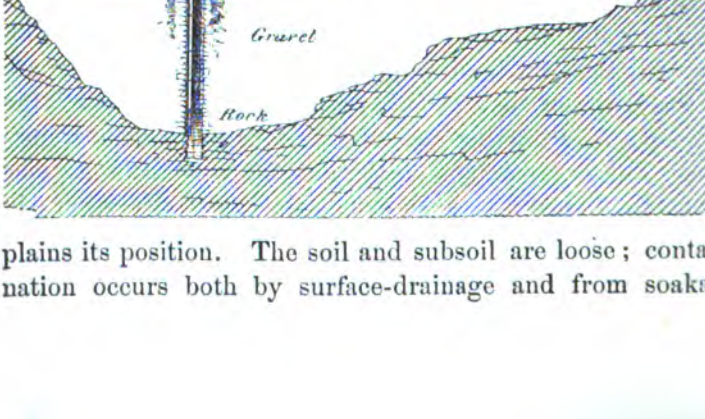
The most erroneous ideas in regard to the liability of wells to contamination prevail among the people. Those who are familiar with the principles of underdrainage by means of porous earthen tiles, know that when they are placed in the earth the water will find its way for quite a long distance on either side to them, and through their pores; yet they are only small vacant spaces in the earth, while a well is a large and deep one, attracting moisture from a much greater distance. But, notwithstanding these well-known facts, persons of high intelligence on most points, feel perfectly secure in regard to their wells, with a cesspool or privy within a few feet of them. Below are given illustrations of several badly situated and contaminated wells. They are only specim of many within the writer's knowledge.

No. 1, situated on Friend Street. The privy above has b for some years cleaned out and the contents placed in a tre between it and the well. All about the privy are ashes garbage from the neighboring house. An analysis of



water was made by Professor Nichols in 1875. (See Re State Board of Health for 1876, page 254.) A numbe serious cases of illness may reasonably be attributed to its It is easy to see how it becomes contaminated. Durin heavy rain, more especially when the ground is frozen, t is direct surface-drainage into it. At other times there be soakage from the filthy earth above. The speci examined was taken when the well was at its best.

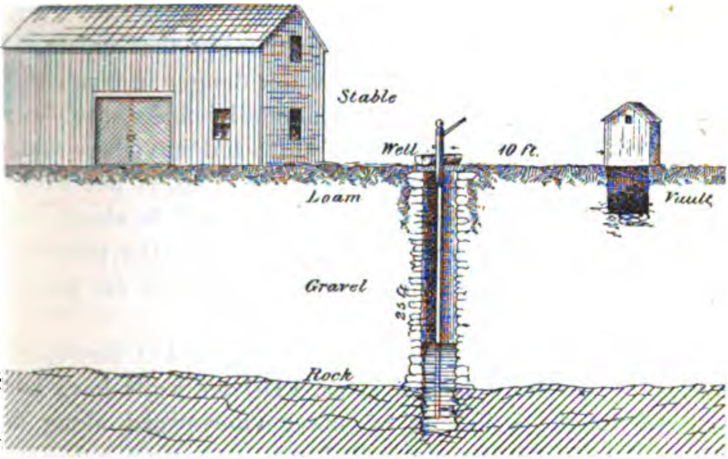
No. 2, situated on Western Avenue. The diagram



plains its position. The soil and subsoil are loose; conta nation occurs both by surface-drainage and from soak

ive cases of typhoid occurred in 1875 in the family living in
e house, and seven more, with one death, among other per-
ons using the water. This house became the centre of infec-
on for a whole neighborhood. An analysis of the water
as made by Professor Nichols, which proved it to be highly
ontaminated.

No. 3, situated on High Street. The well is twenty-five
et in depth, a portion of it being dug into the rock. The
ault is ten feet distant on the same level. There is a cess-
ool in the garden below, and a stable on the left. The



uildings and well are on a side-hill. The premises are kept
lean, and the water, which is clear and of good taste, has
een used for many years. The occurrence of typhoid in the
amily last fall led the physician in attendance to suspect the
ater. An analysis was made with the following result :—

	Result expressed in parts per 100,000.
"Ammonia (unfiltered,)	0.218
Albuminoid ammonia (unfiltered),	0.022
Ammonia (filtered),	0.218
Albuminoid ammonia (filtered),	0.021
Total solid residue at 212° F.,	77.0
Chlorine,	11.6

"Colorless. The large amount of ammonia and chlorine and
the total solids show it to be a water bad to drink. The 77.0

parts of solid matter lose 12 (about) on ignition, but it i large measure due to change of the mineral matter. Th is, however, objectionable organic matter present, and a c siderable amount of nitrates. The mineral matter is mai carbonate and sulphate of lime and alkaline salts. On acco of the deliquescent character of the residue, it is infe that some of the chlorine is in combination with calcium, not all as common salt."

There were five cases of typhoid in the family, and sev others, with one death, among neighboring persons using water.

Enough has been said to show the danger that exists. would be difficult to set forth the whole danger in terms s ciently strong, but we may confidently make the br statement that there is no well of this kind anywhere wi the thickly settled portions of the city that is not sub to a possible contamination. When the well is closely rounded by dwellings and their concomitants, the possibi becomes a probability; in numerous instances an abso certainty.

The other kinds of wells in use are safer, but they sho always be carefully looked after. Driven wells have b polluted by the dribbling of sewage downward along tube. Artesian wells, so called, are not very numer The best example within my knowledge is one on Bo Street, which discharges a constant stream. A well on Street was excavated like an ordinary well for 30 feet, d to the clay; then a boring of 50 feet was made, giving whole a depth of 80 feet. The water rose to within 15 of the surface. It is difficult to see how such a well coul contaminated, except by leakage into the reservoir above clay. There are several more superficial wells of this kin Williams Street. After the clay was reached in excavatin wooden curb was sunk down, the staves being driven into clay. A boring six inches in diameter was made through clay, the water rising to the surface and flowing over the This occurs now only in the wet seasons.

The liability of these wells to contamination depends lar on the character of the curb. Brick, coated with hydra cement, would be better than wood. The well is far preferable to one of the ordinary kind.

The natural character of the well-water of Lynn, as is usually the case in regions having such geological characters, is for the most part good. Near the level of the sea, however, it is apt to be brackish.

The water from the two ponds referred to above has undergone some fluctuations in quality during the short period that has elapsed since its introduction, depending partly on the newness of the works for storing and distributing it, and partly upon some unexplained natural causes; but it now gives better satisfaction than formerly. It is somewhat colored; and many complain of it on this account. It is supplied to about one-half the inhabitants of the city; but it is estimated that not more than one-third use it for drinking and cooking. Breed's Pond was originally constructed in 1842, and improved for public use in 1870. Birch Pond was constructed in 1873. The surface from which the water is collected is admirably adapted for that purpose, being of a sterile, rocky nature, and uninhabited. The total daily capacity of the two ponds is 1,500,000 gallons. This is less than was at first estimated; but the fact had not then been ascertained that the average rainfall of the district is less than that of Eastern Massachusetts, which was taken as the basis of calculation.

The average number of gallons used daily by each consumer is 74.48. This is a large amount when compared with the English supply, but considerably smaller than that of some other American cities. The growing wants of the city render it necessary to increase the amount stored; and the important question is presented as to whence it shall be derived. The natural lakes of Lynn, briefly described on page 172, have been strongly urged as a source. The natural quality of the water is excellent; but the objection is raised that the ponds are situated in the midst of a constantly increasing population, the drainage of which they in a measure receive, and that there is a large cemetery, also growing, upon their water-shed. These facts render a contamination of the waters a matter of extreme probability, unless great expense is incurred to protect them. And the fact is brought forward that if this should be done, the diversion of the face-water would diminish the supply in proportion. The of serious pollution from the villages on the borders of ponds is not an idle one, as is proved by the experience of eral German cities. (See American translation of Ziems Cyclopedia of the Practice of Medicine, Vol. I., p. 59.) poison so conveyed through water, and so deadly in its ef is not discoverable by chemical or microscopical tests.

The alternative is presented for the city to increase its ply by an extension of the plan which has been al adopted. In regard to the propriety of this course, the a division of sentiment among the people. To one exa ing the subject from a non-partisan standpoint, it would to be altogether the safest course to pursue.

Sewerage.—Next to the subject of water-supply in in tance, is sewerage. The work of constructing sewers in was begun in 1866, and has gone steadily but slowly on since. There are now nearly seven and a half miles total of 89 miles of streets. Many of the streets parta the character of country roads to so great a degree as n require sewerage. In the crowded parts of the city the an urgent demand for its extension. So far as any of the sewers already constructed upon health has observed, it appears to be altogether favorable. The pro of determining this effect, however, is so complicated, th statistics at present available do not suffice for its exact tion. But aside from any reduction of mortality that have been effected, it is safe to credit the sewers with do considerable amount of good; for—

1. They have rendered the soil of the streets contai them drier, by establishing a more effective surface-drai and by their action as underdrains.

2. They have abolished a large number of cesspools.

Every private drain entering a sewer does away wit necessity of a cesspool; and so affords more security to and protects the soil from contamination.

3. By improving the general appearance of the streets, have stimulated the residents to greater care of their pre as regards cleanliness. This fact is strikingly observab Sagamore, Beach and Pleasant streets.

But there is one prominent defect in the sewers which demands attention. This is the lack of provision for ventilation. The sewer constructed during the past season in Baltimore Street is ventilated through the catch-basins, an eight-inch hole being made in the central division of the trap. There is now considerable complaint of bad odors arising from the catch-basins in the streets, and the experiment will probably have to be abandoned. All the other sewers are unventilated. In a few instances water-spouts enter private drains, and so afford a sort of ventilation to the sewer; but the experience of other cities has not been such as to warrant any dependence being placed upon this method. The outlets of the sewers are such that they are exposed to the full force of strong winds. In this way there is reason to suppose that the traps of sinks and water-closets have been forced and the sewer-gases driven into the houses. The same result is thought to have occurred during a heavy fall of rain, when the mouths of the sewers were tide-locked. Only one outlet, viz., that of the Shepard-street sewer, and those connected with it, is so situated as not to be filled by the tide.

This grave defect in the sewers, it is to be hoped, the city will remedy before, like Croyden, in England, it is taught wisdom by the occurrence of a destructive epidemic. The manner in which the sewage is disposed of is, prospectively, an evil of great magnitude. It is all discharged into the harbor or on the flats. When it is remembered that the harbor is for a portion of the time nearly emptied of water, it will be seen how dangerous this process is. The accumulation of silt or sewage-mud is going on at a rapidly increasing rate as the sewerage is extended. When the wind is from that direction, and the tide out, there is a very strong and disagreeable odor perceptible in the higher parts of the city. It has been suggested that the sewage should be diverted from the harbor and carried across the marsh to Saugus River. Two objections present themselves to this plan, perhaps not insuperable ones, but certainly to be considered.

1. The distance across the marsh is so great that it would be difficult to give the sewer a sufficient fall to ensure its being kept free from deposit. This might be remedied by pump-

ing; but here the expense is an obstacle not to be disrega in these times.

2. The sewage-mud might be swept around and le Revere Beach, or carried up the river by the tide. In e case parties damaged would have a right of action.

Another plan proposed is to carry the sewers out far the harbor. It is not easy to see how this could be effe except in connection with some comprehensive scheme in a portion of the harbor and dredge out the rest of it. outlay for this would be immense. It is not probable tha sewage could be carried across into Nahant Bay wi pumping; and if it were so carried, it might spoil Beach. The alternative of "sewage-irrigation" rem But there is no suitable land accessible without pum and hardly with. Altogether, the problem of disposi the sewage in Lynn is one of great difficulty, which can be solved by skilled engineers.

House-Drainage.—As only 415 drains, in all, connect the sewers, there being 5,442 occupied dwelling-house Lynn, to say nothing of the numerous shops and other b ings requiring drainage, more than nine-tenths of the se must be allowed to run on the surface of the ground, or some sort of a cesspool. Any estimate of the amount ning directly on the surface would be guesswork, and of value. Suffice it to say, that the practice of discha house-drainage on the surface is not unusual in the outs of the town, where the sink-holes under the back win are as successful in arresting the attention of the san inspector through his olfactories as they are wont to purely rural districts. Sometimes the drainage runs privy-vaults, but this is rare. The most common kind of pool is a bottomless cask or hogshead, set in the ground covered over, first with plank and then with earth. An kind frequently used has an uncovered bottom, open sides and vaulted brick top. This may be said to be the pool in general use in connection with the better cla houses. Some few are cemented and supposed to be w tight. The frequent necessity of emptying these, howe renders them unpopular. Where the soil is sufficiently po to allow the liquid to soak away at all times, the cessp not cleaned out until nearly or quite full of sediment. Out of several thousands of cesspools which exist in the city, only twenty-eight were emptied by the city contractors in 1874, twenty-nine in 1875, and twenty-five in 1876, up to August 25. As less than one-tenth part of the families, shops, etc., supplied with the city water have drains connecting with the sewers, it follows that of the 470,000,000 gallons, more or less, annually consumed, upwards of 420,000,000 gallons are absorbed by the earth in the thickly settled parts of the city. The reader can form his own estimate of the probability of any portion of this water, polluted as it is with offensive organic matter, finding its way into the thousands of wells scattered over the same territory.

House-drains are seldom either trapped or ventilated. The ordinary dwelling-houses have no traps to their kitchen-sink waste-pipes. The water-closets in town are mostly of the "Bartholomew" pattern. It is the usual custom to trap the soil-pipe with a half or full S bend, and then connect with this, without separate traps, the waste-pipes of bath-tubs and wash-bowls on the same floor of the house. Many are introducing the galvanized iron seat ventilators, with good results. A prominent plumber declared to the writer, that if the principles set forth in the article on "House-Drainage," in the last report of the State Board of Health, were correct, there was not a house in Lynn in which the provisions for drainage were perfect. This we can easily believe to be the case, for defects abound everywhere. That they are not more operative for evil, is due to the absence of crowding, and other sanitary advantages which this city possesses in common with others of its size. These advantages are rapidly disappearing as the population increases and filth accumulates about the dwellings.

Surface-drainage.—So far as the streets are concerned, this point is being carefully looked after. A great amount of grading has been done during the last ten years; and much improvement is manifest. The work is still going on, and will, in due course of time, be complete.

Underdrainage.—No systematic attempt seems ever to have been made to deprive the soil of Lynn of any portion of its superabundant moisture. The result has been indirectly attained in some instances by grading to facilitate surface-drainage, thus diminishing the supply which the gro receives, and by the construction of brick sewers, which before stated, act in some measure as porous tile-drains. outside the limits of these improvements, the soil is, for most part, in its original state of dampness or dryness. true that wells, and even cellars, may act as receptacles for water, and cause the soil about them to be somewhat drier; this can hardly be considered an advantage, in a sanitary p of view. Some of the marsh lands have been diked and ditc in order that they might be cultivated. Thus it is seen that idea of "drainage for profit" has occurred to some of people, but I am not aware that that of "drainage for hea ever has. In the damp districts, some of the cellars are vided with wooden or stone drains, the principal objec which is to carry off the water that collects during heavy ra The result of the general inattention to underdrainage great prevalence of damp cellars. The dampness is not equ obvious at all seasons of the year, but is most striki manifest during the fall and spring, when the ground is soa with water, and the protective agencies of frost and suns are not actively at work. Statements going to prove unhealthiness of the damp districts will be given further o

Drainage of Factories.—The drainage of shoe facto does not differ essentially from that of ordinary dwelli and requires no separate mention. Factories for the ma facture of morocco, glue and soap are characterized by offensive sewage, the disposal of which is a matter of s sanitary importance. There are twenty-four morocco tories in town, discharging their sewage as follows:—

Fifteen drain through the sewers, or directly into harbor.

Two large ones, on Market Street, allow the greater of their liquid waste to run into a creek in the rear of shops, between Market and Pleasant streets and the two roads. From thence the overflow finds its way throug wooden drain into the Pleasant-street sewer. The creek once the lower part of the brook which ran down f Munroe Street. It was cut off by the Market-street sew One of the aforesaid factories has a drain entering the Mar street sewer; but having too slight a fall, it becomes clogg and practically inoperative. The creek is extremely filthy; and although it is claimed by morocco manufacturers that the sewage of their shops is not prejudicial to health, on account of its lime and other constituents, which act as disinfectants, it may be seriously questioned whether such sewage, stagnant and decomposing under a hot sun, does not develop gases dangerous to health. At any rate, Pleasant and Harbor streets, notorious for their unhealthiness, are near this creek.

Two morocco factories drain into Strawberry Brook, in the neighborhood of Waterhill Street. The sewage runs at intervals into the lower brook, which is occasionally flushed from the upper brook to secure cleansing. The upper brook usually conveys the principal part of the water to the mill-pond. Between Boston and Waterhill streets, Strawberry Brook is made offensive by this sewage.

One or two morocco factories drain into the upper end of Flax Pond.

One glue factory drains into Stony Brook, above Boston Street. Parties living near say that the brook is very offensive in summer.

Another glue factory is situated on the low land, between Harbor Street and the Revere Beach Railroad. There is a drain which carries off the surplus water of the grounds into a trench by the side of the railroad. From thence a portion of it probably finds its way into the mill-pond. The ground is soaked with filth; and there are offensive, stagnant pools about and under the buildings.

Two soap factories (bone-boiling establishments) situated on Chestnut Street, drain into Bog Meadow. There is much complaint, in the neighborhood, of the disagreeable odors proceeding from these factories; no deleterious influence upon health, however, has been demonstrated. The neighborhood is sparsely settled. The meadow in the rear of the factories is very foul.

One soap factory, upon Lake Street, drains into a vat. This is filled with loam, which is removed from time to time, and used as a fertilizer.

Night-Soil.—Night-soil is either washed away, by means of water-closets and drains, into cesspools and sewers, or allowed to accumulate under privies. The privies are of

varying construction. Some are destitute of vaults ; other
placed over shallow pits. Still others have rudely constr
vaults, stoned or planked up at the sides, with uncov
bottoms. The stones and planks are only intended to g
against the caving in of the sides, not to prevent the l
contents of the vault from soaking away into the e
A few privies have vaults of brick or stone, cemented at
and bottom, and designed to be water-tight; a cond
which they often fail to attain. The great majority o
privies are connected with some shed or out-building, fr
few feet to as many rods from the dwelling. Some a
immediate contact with the house, so that leakage fron
vault into the cellar has been known to occur. No satisfa
provision is made for the cleansing of privies and the ren
of night-soil from the city. Except in some rare insta
in which complaint is made to the police authorities, of p
as being in such an offensive condition as to constitute
intolerable nuisances, the matter of keeping them clean i
to the dictates of individual indifference and cupidity, o
opposite.

A city ordinance requires that the work of cleansing v
and cesspools shall be performed by persons whom the
appoints, at fixed prices, and under prescribed conditi
but only those who make application have their wants atte
to, and then it is at their own expense. The contractor
put under bonds to do the work faithfully, to employ a w
tight cart, to work only at night between certain hour
leave the premises in good condition, and to remove the n
soil either entirely without the city limits, or to such p
within as the authorities may designate. How inade
these provisions are for the necessities of the case, wi
seen by the following facts. The number of dwelling-h
in Lynn, occupied and unoccupied, is 5,532. Many of
are of two tenements, for which separate privies or w
closets are provided. There are 984 water-closets, 1
them being in factories. There are 32 houses with two w
closets each. Making the necessary deductions, we hav
4,758 houses supplied with some sort of a privy. Thi
moderate estimate ; the number being probably greater.
this number, there were cleaned out by the contracto

1874, 468; in 1875, 359; in 1876, up to August 25, 346. Many of these had not been cleaned out for several years previously; some had gone as long as five years. Thus it will be seen that less than ten per cent. of the privies are annually cleansed under the supervision of the health authorities.

In the outskirts of the town and elsewhere, those who have gardens are in the habit of using the night-soil as a fertilizer. Not a few bury it in a trench near the privy. During the year 1876, the night-soil has been carried into the extreme eastern part of the city, and placed, a portion of it in pits and carefully covered with muck, another portion directly on the surface, uncovered. The odor from these pits and heaps was was very troublesome to people living near during the hot weather. It was in this neighborhood that diphtheria was most prevalent throughout the summer months, at a time when, in all other portions of the city, it had in great measure abated its ravages.

Garbage.—The garbage or refuse of the kitchen, which goes by the name of "swill," is collected chiefly by boys, in pails and carts, for the purpose of feeding swine. No supervision whatever is exercised over these boys by the city authorities, but they are allowed to come and go as they will, and to use the sidewalks as highways for the transportation of their disgusting freight. They are accustomed to leave their carts in front of dwellings, under the noses of the residents and passers-by, while they are engaged in searching for the swill or in more reprehensible employment. The evils connected with this system, or lack of system, are various. In the first place, it encourages the poorer classes of the city in the practice of raising swine; and, as a consequence, the filthy pens in which these animals are kept abound in some sections. In the second place, the garbage is not always thoroughly removed. It is usually placed in some open receptacle, as a firkin or box, by the occupant of the house. This vessel, although emptied once a day, or less often, by the swill-boy, is seldom cleaned, and hence becomes foul. In some places the garbage is thrown upon the ground in a corner of the yard with other rubbish. In such cases the swill-boy picks up what he conveniently can, the rest being left to putrefy and poison the air of the locality. The evils arising from a defective removal of kitchen refuse, are manifest in pro tion as people are ignorant and careless of sanitary laws.

Dry Refuse.—The dry refuse of dwellings, such as a broken crockery, old boots, and other kinds of rubbish, n often with a certain amount of putrescible matter, is removed by the teams of the highway department, on placed at the edge of the sidewalk, in barrels or heaps, b occupant of the house. The practice was established se years since by Hon. Hiram N. Breed, then surveyor of ways, and has resulted in much improvement in the ge appearance of the city. Were the moist refuse or removed in an equally systematic and thorough manne benefit resulting would be great. The refuse collect above has been used for filling in at the wharves and else in the city; a practice of which little can be said in com dation.

Piggeries.—Of the abodes of the different domestic ani those of swine are most deserving of mention, from intimate connection with dwellings, and their offensive The ordure which accumulates in them is usually emp as a fertilizer on some neighboring garden-patch. Th that they are most numerous, and in the closest conne with dwellings, in the unhealthy sections of the city, m taken as proof of their evil influence.

Dwellings.—In the character of its dwelling-houses, does not differ materially from other cities in New Eng The most of them are of wood, and so scattered ove abundant space afforded, that in very few localities can be said to be crowded. But in common with dwe almost everywhere, they have certain faults, pertaining to site, construction, or management.

1. *Site.*—In regard to site, the principal defect is that are too often built upon wet land. This is especially tr many constructed within the last ten years; instances observable on the low lands surrounding Bog Meadow o north and east, along the course of Stacey's Brook, and o borders of the marshes. It seems almost criminal to such places to be occupied for habitations, without drained, when there is so much land not open to such c tions remaining to be taken up.

2. *Construction.*—Aside from points which have already been incidentally alluded to under other heads, the chief fault in the construction of dwellings consists in the lack of provisions for a constant supply of pure air. A few houses have openings for ventilation in the chimneys, or have separate flues or shafts for this purpose; but the greater number have no means of ventilating except through doors and windows. When the latter let down at the top, and the matter has intelligent care, the dwelling may be kept well supplied with such air as the city affords, which, in view of what has been said of the condition of privies and back yards in some quarters, may well be supposed to be not always of the best. Owing, probably, to the fact that the impurities of the air are not manifest to the sense of sight, and seldom to that of smell, and to the fact that their ill effects are such as to mislead in regard to their cause, there is a degree of popular neglect of ventilation that is discouraging to the sanitarian. The dampness of the air in dwellings is another point that requires mention. Many that are situated on a porous and well-drained soil have damp cellars and apartments, for the simple reason that the roof leaks or the water runs into the cellar at every rain. In this way, owing to faulty construction, the dwelling may be as unhealthy as though situated on a marsh.

3. *Management.*—By this term is meant, chiefly, care as regards cleanliness, and the proper use of the means afforded for ventilation. The greatest difference is observable. In general terms, it may be stated that the death-rate of different sections and streets varies just in proportion to the intelligence and vigilance of people in keeping themselves and their surroundings, the air they breathe and the water they drink, free from filth. The best natural advantages and most perfect construction of the dwelling, are of little use without this care.

Shoe-shops.—The shoe-shops of Lynn are now to be considered briefly, with reference to their arrangements for ventilation, drainage, warmth and light. They are all, as a rule, well lighted, this being a necessity of the work. In the matter of warmth, there is probably little room for complaint. It is stated, however, that some are kept too warm in winter, the workmen being thereby rendered liable to take cold on going out. Drainage is generally good; inasmuch as the greater number of shops are situated on streets containing sewers, of which the owners can avail themselves. The water-closets, with which the shops are frequently supplied, are extremely prone to get out of order, and to be, consequently, in a filthy condition. There is an almost universal absence of any adequate means of ventilation. Below are given descriptions of two of the larger shops, which may be taken as representatives of the whole.

No. 1. The building is eighty feet long by fifty wide, and consists of a basement or cellar, and four stories. The means of ventilation are the windows, doors, and the elevator, situated nearly in the centre of the building. This is in use much of the time, and allows of considerable circulation of air. There is, however, no escape at the top. The maximum number of hands employed in the shop is one hundred and seventy-eight. The estimated cubic space for each hand is eleven hundred and fifty-one feet. The space afforded for each person is seen to be ample, provided the air be changed often enough. According to best authorities, about three times per hour would be required in order to ensure purity. When this fresh supply is left to the chance opening of doors and windows, it may well be believed that during cold weather the air is not at all times good. There are nine water-closets in the building with a direct supply of water. Those on one side of the building enter one main soil-pipe, which extends upward to the roof, and receives the water from thence at its open end. Beneath the shop it enters a drain, into which the soil-pipe of the other water-closets enters also. Thus it will be seen that all the water-closets are furnished with ventilation. They are not, however, in good working order. The general appearance of the shop is cleanly.

No. 2. The building is old, and consists of two parts, one of which has five floors, and the other, four. The windows are numerous and small. In addition to the usual means of chance ventilation, there is a wooden ventilating-shaft, about fifteen inches square, in transverse section, for the two upper stories, and a scuttle in the roof. The basement contains a stagnant pool of water under the floor, visible where the latter is broken. There are seven water-closets and one urinal, all of which are somewhat offensive. The drainage is into the sewer. In some of the rooms the air was close and bad. Estimated cubic space for each workman, eight hundred and fifty feet.*

The proprietors of the shoe-shops, so far as my experience has gone, have shown the utmost readiness to assist in the inspection, and to allow errors to be pointed out. No satisfactory statistics bearing on the causation of disease by the defective construction and management of shops are at present available.

Intemperance and Immorality.—The amount of intemperance in Lynn, as compared with other places, cannot readily be ascertained. We know the annual number of arrests for drunkenness, the number of intoxicated people helped home, etc., but these figures are only the reflex of the activity, or otherwise, of the police authorities, and give no adequate idea of the extent to which intemperance prevails among the people. But among certain classes of the community, and in certain localities, this vice is a very common one, and it is universally recognized by our physicians as a potent cause of disease and death. In regard to immorality, although it cannot be doubted that there is a general relation between the prevalence of all forms of vice and of disease, yet the subject is presented to the mind of the student of public hygiene chiefly as a cause of venereal disease, and as leading to the practice of criminal abortion. The former cannot be said to be more prevalent in Lynn than in other manufacturing towns. The practice of criminal abortion is frequent. Its effects are the impaired, often the hopelessly ruined, health of the mothers, and a general lowering of the moral tone of society. This melancholy confession can be slightly relieved by the statement, that in the opinion of some physicians the practice has lessened of late years, and that there is manifest an improved sentiment in regard to it among the better classes of the community. Others are hardly willing to make even this admission.

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* The defects in this shop, as regards drainage and the means of ventilation, have been remedied, in a measure, since the visit was made.

IV.—Rates of Mortality.

Having thus far described the population and pointed the conditions, natural and artificial, which influence healthfulness of the same, it will be next in place to de mine the results of these conditions, and to give them as as may be numerical expression.

The annual death-rates of the whole city for the past twe five years are exhibited below. The calculations were all n from original data, the population being estimated in manner indicated on page 180 for all years except thos which a census was taken.*

Annual Death-rate of Lynn for Twenty-five Years (1851–75, inclus

YEARS.	Number per 1,000 of Population.	YEARS.	Nun per 1, Popu
1851, ...	16.8	1864, ...	21
1852, ...	17.9	1865, ...	2
1853, ...	18.3	1866, ...	18
1854, ...	16.8	1867, ...	16
1855, ...	20.8	1868, ...	17
1856, ...	17.8	1869, ...	18
1857, ...	17.2	1870, ...	17
1858, ...	17.9	1871, ...	19
1859, ...	17.1	1872, ...	24
1860, ...	17.7	1873, ...	2
1861, ...	20.3	1874, ...	18
1862, ...	18.5	1875, ...	19
1863, ...	20.3		

The mean rate for the whole period is 19.1. As will observed, the maximum rate, 24.5, was attained in 1872, minimum, 16.2, in 1867. The former was a year of unu mortality throughout the State, and the latter one of unc mon exemption from fatal disease.

In accordance with the established custom, still-births h been omitted in determining these rates. There seems to no good reason, however, for such a course, inasmuch as number of dead-born children in any community shows certain extent the degree of diffusion of syphilis, scrofula and similar causes of feebleness in offspring; while the somewhat rare instances in which vigorous children perish during birth from difficult labor or some accidental complication, are just as properly included in the estimates as are the deaths from drowning, injury, or other forms of violence.

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* The estimates given in the Massachusetts Registration Reports are inaccu except as to the census years; the rates of mortality generally appearing too In the general abstracts the reverse is the case. The latter are not available comparison of different towns, owing to widely varying rates of increase.

There is reason to suppose that the value of our figures is somewhat vitiated by imperfect registration. The remark is the more applicable as we go back in time. But although we can surmise an incompleteness of the registration from failure of the undertakers to make due returns, or other cause, we cannot from the nature of the case demonstrate it. We know, however, that a certain number of persons are buried and their deaths recorded in Lynn, who lived and died in other towns. We may presume, too, that some who died here are buried in other places, where, also, their deaths are recorded. The effect of these two kinds of error upon the death-rate is precisely opposite. It is fair to assume that they about balance each other. No exact correction is possible. It is well known, also, that many of the working people of Lynn, transient residents as they are, acquire disease of a fatal character here and go to their country homes to die; thus relieving the city of a large annual addition to its mortality list. On the whole, it may be stated, that the death-rate of Lynn appears somewhat lower than it would if all the facts bearing upon it were obtainable. But the same sources of error probably exist in all the towns of the Commonwealth; so that a comparison with them will be just.

The accepted average death-rate of Boston is 24.5 per thousand of the population.* This is 5.4 more than that of Lynn. But the overwhelmingly greater size of the former city makes the comparison of less value than it would otherwise be. I therefore subjoin a table showing the death-rates for ten years of eleven cities of Massachusetts, having, by the census of 1875, over 20,000 inhabitants. The data are taken mainly from the Thirty-Third Registration Report of Massachusetts, p. cxvi *et seq.* But the rates there given are rejected as being too low; the results of the census of 1875 being taken as a basis of computation, instead of the mean population, as estimated for the ten years. I have employe the arithmetical mean of the population for the two censu years 1865 and 1875. This does not differ sufficiently fro the true mean to make any appreciable error in the rate The rate for the State at large, and, as a matter of especi interest in this connection, those of the neighboring tow which once constituted a part of Lynn are stated. The birt rate for the same period is also given, inasmuch as it is som times asserted that it is the "controlling element" of t death-rate; a statement which is here seen to be fallacious.

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* See Report on the Sanitary Condition of Boston, by Dr. T. B. Curtis, 1875.

	Population in 1875.	Death-rate.*	Birth-rate.*	Differenc
Lynn,	32,600	19.4	26.7	7.3
The State,	1,651,912	19.2	26.2	7.0
Worcester,	49,317	22.4	32.9	10.5
Lowell,	49,688	22.2	23.8	1.6
Fall River,	45,340	21.8	27.7	5.9
Salem,	25,958	20.4	16.8	—3.6
Cambridge,	47,838	20.0	30.8	10.8
Somerville,	21,868	19.6	33.2	13.6
Lawrence,	34,916	19.1	30.6	11.5
Springfield,	31,053	18.9	27.5	8.6
Chelsea,	20,737	18.8	26.6	7.8
Taunton,	20,445	17.6	26.4	8.8
New Bedford,	25,895	17.3	19.5	1.2
Lynnfield,†	769	16.3	19.9	3.6
Saugus,†	2,578	15.4	17.7	2.3
Swampscott,†	2,128	15.2	25.4	10.2
Nahant,†	766	11.7	28.0	16.3

By this table it will be perceived that there are five citi of more than twenty thousand inhabitants in Massachuset whose death-rates are lower than that of Lynn, and six who death-rates are higher. Somerville and Lawrence differ onl by two- and three-tenths, respectively. Some of our littl neighbors are so far above us in healthfulness that a compar son seems almost odious. The great lack of corresponden between the birth- and death-rates in this table is a matter f observation. How far differences in the care with whic births and deaths are registered will account for the remarka ble variation here shown, I do not undertake to say. We ma conclude that the position of Lynn, as to healthfulness, among the cities of the State, is a medium one; it does not make the best showing, while it is very far from making the worst.

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* Mean of the years 1866 to 1875, inclusive.

† Formerly Lynn.

Mortality at Different Ages.—There is no more accurate test of the sanitary condition of any place than the mortality among its children. Those of tender age are almost constantly at home and exposed to whatever causes of disease may be localized there. Their systems are very susceptible to the influences of bad air, water and food. In the transition state of any town from the comparative salubrity of a country village to the unhealthy conditions of an urban community, children are the first to feel the change. They are the advance guard, first under fire from the forces of disease, and suffering most severely. We have seen that the general death-rate of Lynn is not very high as compared with other places. We will now analyze this rate, to see if any one age contributes more or less than its share. As our principal object in the inquiry is to ascertain how the children are affected, the rates are given for three groups only; viz., those under one year, those under five, and those over five. In the first table, Lynn is compared with Boston and with the State at large, for the two census years 1865 and 1875. The census of 1870 did not give the age-distribution of Lynn.

Deaths per 1,000 at Specified Ages.

		1865.	1875.	Mean.
Lynn,	Under 1,	211.2	251.7	231.4
	Under 5,	79.0	73.1	76.0
	Over 5,	15.5	12.8	14.1
	All ages,	22.1	19.4	20.7
Boston,	Under 1,	265.5	275.8	270.6
	Under 5,	92.9	86.8	89.8
	Over 5,	15.6	18.8	17.2
	All ages,	23.6	26.1	24.8
The State,	Under 1,	205.2	226.5	215.8
	Under 5,	68.7	77.7	73.2
	Over 5,	14.9	14.8	14.8
	All ages,	20.6	21.1	20.8

From this table we see that the mortality among children in Lynn is less than in Boston, but considerably greater than in the State. The rate among children under one is greater in 1875, a year of average healthfulness, than in 1865, when the general rate was exceptionally high. This leads us to infer that the death-rate among infants is increasing. If any further proof of this statement is required, it can be obtained from a consideration of the percentage of deaths under one to births. They are given for two successive quinquennial periods in the following table:—

YEAR.	Percentage.	YEAR.	Percentage.
1866,	15.1	1871,	24.7
1867,	16.1	1872,	25.6
1868,	13.6	1873,	20.7
1869,	20.1	1874,	16.7
1870,	19.5	1875,	18.2
Average,	16.9	Average,	21.2

The difference in the averages for the two periods is 4.3. The average number of deaths under one to the whole population for the first period is 4.5; for the second period, 5.5; a difference of one. The average number of deaths under five for the first period is 6.7; for the second period, 8.1; a difference of 1.4. Although the general rate of mortality is much higher for the second period, yet the increase is disproportionately large for the ages under five.

Mortality of Natives and Foreigners compared.—As in other cities of the Commonwealth, so in Lynn, the rate of mortality among those of foreign parentage is decidedly greater than with the native stock. The special enumeration of the population of Lynn, made for the State Board of Health, has enabled me to institute a pretty exact comparison in regard to this point. Those of mixed parentage have been reckoned as natives, and their deaths so regarded. For this reason the statement of difference in mortality may be considered rather under than over the truth.

YEAR.	Death-rate among those of Foreign Parentage.	Death-rate among those of American Parentage.	Difference.
1871, ...	23.4	17.2	6.2
1872, ...	28.9	21.7	7.2
1873, ...	23.9	19.9	4.0
1874, ...	20.4	16.5	3.9
1875, ...	24.2	15.7	8.5
Mean, ...	24.1	18.2	5.9

If the calculation is carried back still further, the same difference appears. I have assumed that the proportion between the foreigners and their children is the same for the successive years, and taking the average annual percentage of increase, have estimated the number for each year. It may be asserted by some that the higher death-rate among the foreigners is due mainly to a higher birth-rate, which furnishes a greater number of victims for infantile disorders. That there is a basis of truth for this assertion cannot be denied; yet a reference to the following table will show, that while in regard to past years, the explanation may account for a part of the difference in mortality, yet it cannot for all, and that recently it fails altogether:—

YEAR.	Native Birth-rate.	Foreign Birth-rate.	Difference.	Diff. between Native Birth- and Death-rate.	Diff. between Foreign Birth- and Death-rate.
1871, ...	20.0	27.3	7.3	2.8	3.9
1872, ...	25.8	38.3	12.5	4.1	9.4
1873, ...	24.7	33.7	9.0	4.8	9.8
1874, ...	23.8	28.5	4.7	7.3	8.1
1875, ...	23.1	27.4	4.3	7.4	3.2

It is here shown—

1. That the difference between the native and foreign birth-rate has steadily diminished for the past four years.

2. That while the natural increase of the natives (*i. e.*, the difference between the birth- and death-rates) is increasing, that of the foreigners is diminishing.

3. That for the last year of the period covered, natural increase of the natives has been more than dou that of the foreigners.

But if the difference in the birth-rates of the two clas does not account for the difference in mortality observ what are the causes? I think they may be summarized follows :—

1. A very general selection by foreigners of the m unhealthy spots as places of residence.

2. A less intelligent appreciation by them of the law correct living, as regards cleanliness, ventilation, tem ance, etc.

I do not believe it can be truthfully asserted that ther an innate proclivity to disease in any one of the races mak up this foreign population, sufficient to account for the r tively great mortality among them.

Mortality of the Sexes compared.—The death-rate of fem in Lynn appears to be somewhat lower than that of ma From 1866 to 1875, inclusive, the number of deaths thousand was: among males, 20.9; among females, 1 or 1.5 less. The lower rate of mortality among fema taken in connection with their greater numbers, expla partially, the low general rate of the city.

Normal Death-rate.—I have calculated the so-called " mal death-rate" of Lynn for the two census years 1865 1875, making use of the United States life-table, with following result.

In 1865, the normal death-rate was 20.7; the actual b 22.1, or 1.4 more. In 1875, the normal death-rate was 2 the actual being 19.7, or 1 less. This normal death-rat of little value, owing to the prodigious guesswork w forms the basis of the United States life-table.

Some English authorities have assumed a death-rat seventeen per thousand as normal. The appropriatenes this term may well be questioned. Strictly speaking, normal death-rate will only be attained when all die of age. That such a millennial freedom from disease will be reached by the human race is not to be believed. Y were well to aim for the ideal standard of healthfulness, not for some lower one misnamed the "normal."

V.—Prevailing Diseases.

The prevailing diseases of any locality may be considered as belonging in two general classes. First, those which frequently produce a fatal result; and second, those which rarely or never do so. The degree of prevalence of the fatal class can be ascertained approximately by consulting the record of deaths. But here we are met by such palpable and constantly recurring instances of erroneous or incomplete diagnosis, that the statistics are almost valueless for a comparison of diseases among themselves. But, as this is the best source of information we have, we must avail ourselves of it, bearing in mind its probable errors.

The degree of prevalence of non-fatal diseases can only be determined by consulting physicians, and others, who have means of observation. No statistics are available; but the general conclusions may be considered nearly as reliable as those concerning the fatal diseases.

Following the nosological arrangement which has been adopted for the registration of diseases in Massachusetts, it is found that for the last ten years the different classes are credited with the following percentages of the total mortality in Lynn:*—

Class I.—Zymotic diseases,	26.4
II.—Constitutional diseases,	27.6
III.—Local diseases,	24.7
IV.—Developmental diseases,	18.4
V.—Violent deaths,	2.9

The most important of these classes, from a sanitary point of view, is the first, for the reason that it contains so many of those diseases which are, to a greater or less degree, preventable. These will now be considered in detail, beginning with those which occasion the greatest amount of mortality, and following the order downwards. As is customary with writers now, diarrhœal diseases are grouped together. All the deaths but seventeen in the class belong to the miasmatic order.

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* These percentages are of all deaths for which a cause is assigned. In the "unknown" class are included "*Hemorrhage*" and "*Tumor*."

Diarrhœal Diseases.—These have been reported in I
under the names of cholera infantum, dysentery, diarr
and cholera morbus. The first named has produced n
four times as many deaths as all the others combined.
gether they stand credited with 631 deaths in ten years (
to 1875, inclusive); a percentage to the total mortali
11.2, and to the zymotics of 42.4. The mean numbe
1,000 of the population for the period named is 2.26.
is greater than the rate which obtains in the State at l
and but little below that of London. It is probable tha
larger number of those cases which are reported as "can
and are reckoned in the class of constitutional disc
belong here. The same is true of many other infantile
orders of nutrition, which appear in the record of deat
"infantile," "teething," "convulsions," and some of
called "consumption." It is customary with many p
to designate a disease by its most prominent final symp
whether that be an apthous sore mouth ("canker"), wa
of the body ("consumption"), convulsions, or other
festation. The above is one of the sources of error i
registration which has been before alluded to. As is us
the case, the great majority of the victims of diarrhœa
eases are children.

Typhoid Fever.—Under this head are included, h
those cases reported as "typhoid fever," one case report
"typhus fever," two as "bilious fever," six as "gastric fe
and thirty-three as simply "fever." It has been consi
justifiable to regard all the different cases as typhoid, fo
reason that this is the principal continued fever recogniz
medical writers in this part of the country. It is pos
that some of those cases reported as "fever" may be of
origin, like lung fever or brain fever; but the probab
are against this. At any rate there is no more reas
doubt those statistics than those in regard to other affect
The whole number of deaths in the ten years is 263; a
centage to the total mortality of 4.6, and to the zymot
17.6. The mean rate per thousand of the population is 0
This mean rate is higher than the maximum of Boston
1851.* It is at least one-third greater than the averag

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* See Report on Sanitary Condition of Boston, p. 105.

of Boston. But the disease is less prevalent here than in the purely rural communities.* It is, however, constantly present with us, and is nearly twenty-fold more destructive to life than the much-dreaded small-pox. It is also better understood in regard to its causes and means of prevention, than are some others of the zymotics. It is eminently preventable by sanitary measures. Two points are now admitted by many of the best authorities in respect to its etiology. 1st. That it is due to a specific poison, which can produce this disease and no other. 2d. That this poison is conveyed into the system by means of polluted air, water or food.

Filth alone, in the opinion of the writer, is not sufficient to cause the disease, but furnishes the conditions for its development and spread. In this place it appears to originate most frequently in contaminated well-water; and it is only necessary to recall what has been said in regard to the subsoil of Lynn and the character of its wells to understand why the disease is exceptionally prevalent.

In order to furnish evidence of a conclusive nature, a large number of cases have been investigated by myself and my assistant in this work, Dr. S. W. Clark. The facts adduced seem to support the theory given above.

Out of the fifty-three cases investigated, in forty-two of them the patients had habitually used well-water. The water of the wells from which eighteen of this forty-two drew their supply was proved by chemical examination to be badly contaminated by drainage from privies. In one other case the water was examined and shown to be slightly contaminated. Of the remaining twenty-three using well-water, in the case of eleven the wells were so badly situated as to excite suspicions of contamination. No chemical examination was made.

Out of the eleven persons who did not use well-water, five were shown to be exposed to emanations from cesspools or drains. In only six of the fifty-three cases were the hygienic conditions free from serious defects. In many of the cases a variety of circumstances tending to the production of this and other diseases was observed.

Typhoid has diminished in frequency since the introduction of pond-water, and the decrease is more especially noted in

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* See Paper by Dr. Derby in Second Annual Report, State Board of Health.

the thickly settled parts of the city, the probable reaso
this being that there the pond-water is more generally
in preference to the wells, than in the outskirts.

Scarlatina.—This terrible scourge of childhood ranks
among the death-producing zymotics in Lynn. Like ty
fever, it is so constantly present with us, that it may be
sidered endemic. Yet it varies greatly in the degree
prevalence at different times and seasons. It has caused,
ing ten years, 204 deaths, an annual average of 20.4.
maximum mortality was reached in 1875, when it numb
55 victims. The next highest mortality was in 1874
deaths), and the minimum in 1866 (5 deaths). Its av
percentage to the whole number of deaths is 3.6; t
zymotics 13.6. Mean number per thousand of popula
0.73. An examination of the map will show that it is
fatal, if not more prevalent, in the unhealthy sections o
city. In its distribution it seems to follow the same la
other diseases, and to seek places where its presence is
needed to fill up the measure of mortality, thus verifyin
Scripture adage, "To him that hath shall be given."
the healthiest section, and the most carefully managed h
holds are not exempt from its visitations and its rav
There are no restrictive regulations in force in regard
Children from families affected are allowed to attend sc
and no measures of disinfection are required after reco
Were a strict system of registration, isolation, and pur
tion adopted, there is little doubt that the disease migh
much diminished in frequency, if not virtually stamped

Diphtheria and Croup.—These diseases are reckone
gether, not as implying that they are identical, but on acc
of the very general confusion of diagnosis. It is unques
able that diphtheria does sometimes make its first appearan
the larynx, producing a case of diphtheritic laryngitis, w
in its symptoms, course and termination cannot be di
guished from membranous croup, if that be a separate
ease; and on the other hand, when ordinary diphtheria ca
great obstruction in the pharynx, the difficult breathing

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* Since this was written, I have learned that the school committee have pass
order forbidding children from families affected with scarlatina, small-pox, dipht
etc., to attend school. It may be reasonably doubted whether this order will b
ried out.

lead physicians and attendants to speak of the case as one of croup. Hence no attempt is made to separate the diseases in the statistical inquiry.

From 1866 to 1875, they have caused 152 deaths, or 2.7 per cent. of the mortality. The percentage to the zymotics is 10.2. Mean number per thousand of the population, 0.544.

But the period embraced in this inquiry is sandwiched in between two epidemics of diphtheria, the one reaching its climax in 1865, and the other being now in progress. For this reason our rates appear lower than they would if a larger number of years were included. The present epidemic began in 1875, but did not become very general until last spring. Since then, however, it has occasioned such a large amount of mortality, that its treatment is reserved for a separate paper.*

Whooping-cough.—Whooping-cough comes next on the list, but it is "next by a long interval." Only 62 deaths are attributed to it in ten years. This is a percentage of 1.1 of all deaths. It is greater than the average percentage of Boston, but much less than that of England. It is the opinion among our medical men that whooping-cough is rarely or never fatal with us, except through complications, the most frequent of which are catarrhal pneumonia and acute hydrocephalus. The former comes on as the result of exposure, and the latter occurs chiefly in tuberculous children. In either case the death is but seldom ascribed to whooping-cough when the report is made by a physician.

Cerebro-Spinal Meningitis.—This, which is known in our community as the "new disease," does not appear in the records of mortality until 1872, when it stands credited with one death. In the year following, 32 were ascribed to it, and in 1874, 11. These compose the total number, 44. But there is no good reason to suppose that it has never occurred previously. With the prevailing ignorance and carelessness in regard to both diagnosis and registration, it would not be at all strange if some cases of death from this cause got into the records under the heads of "convulsions," "disease of the spine," or "disease of the brain." So far as the disease has been observed here, its most common habitat is the badly drained and otherwise unhealthy quarters of the city.

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* This appears at a later page under "Health of Towns."

Erysipelas.—This disease is prevalent at times, but it
not be said to be very fatal. Twenty-nine deaths have
ascribed to it in ten years.

Rheumatism.—In its various forms, acute and chronic r
matism is very frequently met with in Lynn. It st
charged with 26 deaths in ten years, chiefly caused by r
matic fever. It is probable that, indirectly, it is the occa
of many more deaths through the production of valvular
ease of the heart. These, however, appear usually unde
name of "heart disease."

Measles.—This affection is widely prevalent, but sel
fatal. Indeed, it seems to be uniformly of a mild type.
is possible, however, that some cases of death from pneu
nia, which occasionally occurs as a fatal complication of
sles, should be ascribed to it instead of the former affec

Small-pox. — Small-pox cannot be charged with a
share of our mortality. It has occasioned only 15 death
ten years, a percentage of 0.026 to the whole num
During the time of its great prevalence in Boston, it occu
here in repeated instances, but did not assume a very
form. The city authorities have always taken wise and
cient measures to limit its spread. Had the course here
sued been followed by all other cities and towns in the
monwealth, there would have been a great saving of life.

Alcoholism is widely prevalent; but as it is not popul
die a drunkard, its victims are hardly ever credited t
unless they are poor and friendless.

Influenza, or catarrhal fever, is extremely frequent at
tain seasons, and when an epidemic influence is abroad.
rarely fatal. Five deaths are ascribed to it in ten years.

Syphilis is another zymotic of which it is not consid
creditable to die. For this reason it seldom appears in
records as a cause of death. It is not as prevalent here
larger cities; but unquestionably produces a vastly gre
amount of mortality than is shown by the records.

Malaria.—Four deaths in the ten years are ascribe
malaria. The cases are mostly imported. The writer
however, known of one that appeared to be genuine i
mittent originating on the low, wet land close by
Meadow. It was cured promptly by quinine.

Purpura is charged with four deaths in ten years; car-
ncle, tape-worm and malignant pustule with one each.

The percentage of the mortality caused by the constitutional
eases is divided as follows between the two orders of that
ss: diathetic, 10.9; tubercular, 16.6. Only one of the
cial diseases embraced in these orders is of sufficient im-
tance in connection with our subject to require extended
ice.*

ulmonary Consumption.—This stands at the head of
th-producing causes in Lynn, as in the country at large.
as produced 1,098 deaths in ten years; upwards of 19
cent. of the deaths from specified causes. In early times
sumption was not a frequent disease here, if we may
lit Lewis, the historian of Lynn. He says (p. 81, His-
) that "formerly a death by this disease was a rare occur-
e, and then the individual was ill for many years, and the
jects were usually aged persons. In 1727, when a young
died of consumption at the age of nineteen, it was noted
remarkable circumstance; but now young people fre-
ntly die of that disease after an illness of a few months."†
here was no public record of deaths that had any claim
ompleteness until the year 1844. The church or parish
rds are available; but it is doubtful if they are fully reli-
, even in respect to the members of the parish. Lewis
that "of 316 persons whose deaths were noticed in the
t Parish for about 20 years previous to 1824, 112 were
subjects of consumption; and in some years since then,
e than half the deaths have been caused by that insidious
ady." This certainly shows a much greater percentage of
tality than has existed now for a long time. The phthisis-
has been decreasing for some years, as is shown by the
owing table:—

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s it is impossible to consider separately all of the long list of special diseases
ging to this and the following classes, a selection is made of those which are
ively most prevalent in Lynn.

he "History of Lynn" was first published in 1844.

Deaths from Consumption for Five Census Years.

YEAR.	Percentage of Total Mortality.	Number per 1,000 of Population.	YEAR.	Percentage of Total Mortality.	Nu per 1 Popu
1855, . . .	25.3	5.28	1875, . .	18.2	3
1860, . . .	25.9	4.61			
1865, . . .	22.2	4.96			
1870, . . .	19.9	3.43	Mean, .	22.5	4

The averages for ten years (1866 to 1875) are a little
than those given above, but higher than those of the St
The decrease here observed may be partially owing to
greater degree of discrimination used in reporting cases.
is a well-known fact that the term "consumption" is emplo
as a convenient euphemism for alcoholism, syphilis, and s
lar disorders, and as a refuge from the charge of ignoranc
obscure cases of internal disease. I think there is good
son to doubt if genuine phthisis were ever as prevalent as
earlier statistics would seem to show. In comparison
other cities and towns of Massachusetts, Lynn ranks am
those having the greatest amount of consumption. In
Registration Report of Massachusetts for 1866 is a comp
son of the 333 towns and cities then existing in the State
respect to the prevalence of phthisis, based on the return
the ten previous years. In this, Lynn is No. 308; the t
having the most (Randolph) being No. 333.

The causes of the undue prevalence of consumptio
Lynn must be looked for in the abundance of our wet
undrained lands, in neglect of ventilation, and that carel
ness in the mode of living which is particularly characteri
of a certain portion of the population. But little influe
in my opinion, can be attributed to the east winds, or
moist air of the sea. As to severity of climate, Lynn
suffers in common with New England. An inspection of
mortality map will show that the black dots, represen
deaths from consumption, are most numerous where the l
is low, the clay near the surface, the sanitary conditio
general defective, and the people largely of immediate fore
descent. These conditions frequently coexist.

lcute Diseases of the Lungs.—These alone, of the class ocal diseases, require separate mention. They are included under the names of pneumonia, bronchitis, inflamion of the lungs, congestion of the lungs, lung fever, irisy, and "disease of the lungs." Sixty-nine cases were orted as "disease of the lungs" in ten years. Fifty- of these occurred in 1868 and 1869, only four deaths g ascribed to pneumonia during that time. As these are only years in which the latter disease is credited with so deaths, it is thought probable that those resulting from vere included in the deaths from "disease of the lungs." whole group have caused 383 deaths in the ten years; per cent. of the total mortality. Only consumption and group of diarrhœal diseases can claim a greater number of ims.

'neumonia is not very frequent, but its relative mortality is 1. Bronchitis is extremely common, but rarely fatal except 1 old people and children; and then the death is often ribed to something else.

n regard to those diseases which rarely prove fatal, Lynn s not differ sufficiently from other places in the Commonlth to render any extended remarks necessary. Briefly, vever, it may be stated that mild catarrhal affections of various portions of the respiratory mucous membrane are eedingly common. Frequently recurring acute attacks of e disorders lead to the chronic form; so that one often ets persons who are never free from the necessity of blow- the nose, hawking to clear the throat, or coughing. The at prevalence of nasal catarrh here, as elsewhere in New gland, may, I think, be looked upon as a cause of the habit 'talking through the nose," so called, which is regarded characteristic of the Yankee race. Children acquire the it often through unconscious imitation of their elders. cause of these diseases is usually referred to the climate; this certainly finds efficient allies in irregularly heated ps and dwellings, in lack of ventilation, and in all those ditions that lead to impaired vitality.

nother prevalent non-fatal disease is dyspepsia. In its protean forms it affects a large proportion of our populati male and female. The form most commonly met with is one which goes by the name of "biliousness." The cause to be found, partially at least, in the undue rush and hurry our busy seasons. The manufacturer has large orders to and urges on his men; the latter wish to earn as much possible to make up for the loss during the season of idlene The hurry extends, even to eating and sleeping, all classes the people being somewhat affected with the same spirit contagion; and so the mischief is done which outlasts cause.

Non-malignant affections of the uterus may also be m tioned in this connection. They are especially preval among those females who work in shops. While one ca of such troubles has been removed in the substitution steam for foot-power in running sewing-machines, yet th are still a great variety of circumstances which tend to p duce them. It is hardly possible for a woman to becc debilitated from overwork, and continue so for any g length of time, without experiencing a certain amount disturbance of the menstrual function. Neglected, as s disorders usually are, the functional derangement becor organic disease, and perhaps a life-long source of suffering

VI.—HEALTH OF DIFFERENT DISTRICTS AND STREETS

If we were to judge by the general death-rate alone might seem that Lynn already possessed a degree of hea fulness accorded to few cities of its size, rendering measures of sanitary reform unnecessary; and this, withstanding the fact that in our inspection of the city, found many conditions tending directly to the production disease. But it must be remembered that the general rat an average, simply, and that it may be a mean between wide extremes. By an examination of what follows, it be seen that there are in our city, districts and streets wh present rates of mortality equal to those of the most crow cities, lying side by side with other districts and streets wh rival the most favorably situated country town in health ness. That this could be the case without local causes op ing to produce the difference observed, will hardly be lieved by any one. If it be possible to determine with ecision these local causes, the work of removing whatever prejudicial to health will be materially aided.

The difference in mortality referred to has been set forth in o methods; first, by means of the map which accompanies is Report; secondly, by means of mortuary statistics. The p in a measure explains itself. Upon its surface are repreted the deaths from consumption, cholera infantum, pneunia, typhoid fever, scarlatina, diphtheria and croup, occurg in the city for ten years from 1866 to 1875 inclusive. must be acknowledged that, owing to imperfection of the ords, a portion of these deaths could not be located h sufficient accuracy to warrant their being put down; l that some are, undoubtedly, at a little distance on the eet from the exact spot of their occurrence. But these ects do not impair the value of the map for its purpose, ich is to present an illustration to the eye of the relative ount of mortality occurring in different sections of the . In forming an estimate of this amount from the map, is necessary to take the density of the population, shown roximately by the tinting of the surface, into the account. e height of the land above low water and the depth of the y from the surface being also indicated, it is interesting to erve the distribution of deaths with reference to these nts. The fact can hardly fail to be noted, that in several ces where the death-spots are aggregated with unusual seness, the clay is near the surface. The grouping of spots sections naturally wet was more manifest in the earlier rs of the period. Latterly these natural defects have in ne places been removed by drainage, and the death-rate in sequence lowered.

The conclusions to be drawn from a careful inspection of is map are amply sustained by the statistics derived from a dy of the death-records. By means of these statistics and the special enumeration of the population by streets, it has en possible to calculate the death-rates of the streets, and o to divide the city into health districts. In performing latter task, it has been necessary to avoid, as much as

possible, the division of streets on account of the added di
culty of distributing the deaths. For this reason, the li
do not always follow the courses that would be desirable, a
the difference between the districts is less marked than
would otherwise be. In going through the records, it w
found that some of the deaths did not properly belong
Lynn; in others, no residence was given, and no amount
searching in directories or undertakers' books (the ultim
resort) would suffice to reveal it. These had to be omitt
so that out of 3,705 deaths, exclusive of still-births registe
from 1870 to 1875 inclusive (the period covered by the inv
tigation), only 3,592 could be located. This number is, ho
ever, obviously sufficient for the purpose. The omitted dea
are largely among those of foreign parentage; therefore t
result of their omission is to diminish the death-rate of th
districts which have the greatest foreign population. It w
be remembered that the spots on the map show only dea
from consumption, pneumonia, and certain of the princi
zymotics; while the statistics include all deaths, so far
it was possible to locate them. An exact corresponden
therefore, between these figures and the indications of t
map will not be looked for.

Health Districts.—The city is divided into eleven distric
differing somewhat notably in healthfulness. The followi
table sets forth the population of the districts in 1875, t
percentage of foreigners, the general death-rate, and spec
rates for consumption, diarrhœal diseases, acute diseases
the lungs, and four zymotics, averaged for six years.

Districts I., II., III. and IV., having a population
8,519, present an average death-rate of 24.4, nearly the sa
as that of Boston. On the other hand, Districts VII
IX., X. and XI., with a population of 10,263, have a deat
rate of 16.6, somewhat lower than the so-called "norma
The average of the other three districts combined is a litt
below that of the city as a whole.

Table of Health Districts.

HEALTH DISTRICTS.		Population, 1875.	Percentage of Foreigners and their children to whole population.	DEATH-RATE: Mean of Six Years (1870 to 1875, inclusive), Still-births excluded.				
	Name.			General.	Phthisis.	Diarrhœal.	Acute Disease of Lungs.	Typhoid, Scarlatina, Diphtheria and Croup.
I.[1]	Waterhill, . .	2,533	59.5	25.4	4.9	3.6	1.4	3.0
I.[2]	Harbor, . .	3,449	63.7	25.1	4.3	3.4	2.3	3.5
I.[3]	Western, . .	1,892	30.0	22.1	4.2	2.8	1.7	2.8
V.[4]	Wyoma, . .	645	5.6	22.1	2.8	2.2	1.4	4.4
V.[5]	Central, . .	5,999	21.4	19.6	3.5	1.9	1.6	2.1
I.[6]	Eastern, . .	4,633	23.4	18.5	3.7	2.1	1.6	1.8
I.[7]	Franklin, . .	3,185	14.6	18.4	4.0	1.9	1.3	2.1
I.[8]	Glenmere, . .	1,685	12.4	17.3	2.7	2.4	1.4	1.4
X.[9]	Common, . .	4,343	15.5	17.1	3.2	2.1	0.9	1.2
.[10]	Highland, . .	1,972	37.1	16.0	3.0	3.1	1.4	1.7
.[11]	Ocean, . .	2,264	8.1	15.5	2.3	1.6	1.2	1.7
	City, . .	32,600	28.5	19.5*	3.6	2.4	1.5	2.1

Only those deaths which have been distributed among the different districts have
used in determining these general rates. The rates are all based upon a care-
estimated mean of the population for the six years.

istrict low-lying. Soil generally damp. No artificial drainage. Strawberry
k, polluted by drainage from morocco factories, flows through it. In many
ts the sanitary condition of dwellings is bad.
orders the harbor, which is foul from sewage. The glue factory and polluted
before described are within its limits. Many dwellings in bad condition. Clay
surface. Sewers.
parsely populated. Much of soil wet. No artificial drainage. Clay on low lands
surface. Dwellings variable, good and poor.
igh and dry. Many people of poorer class. Sanitary condition of many dwell-
defective.
enerally well drained. A few places damp. Many boarding-houses. Many
ts and few children. Sewers.
portion of the land wet. No artificial drainage, save partially for surface.
tary condition of dwellings variable, good and bad.
istrict well-conditioned, as a rule. Soil naturally damp. Formerly marshes.
nage by sewers.
istrict with all characteristics of a country village. Soil dry, save round Bog
dow. No artificial drainage.
anitary condition of dwellings mostly good. Soil dry, except near marsh. One
o sewers. Clay deep.
Sanitary condition of dwellings good, with some exceptions. High and dry.
ral drainage excellent. No sewers.
Sanitary condition of dwellings good. Soil dry. A few sewers. No clay has
found.

TE.—The word "good," as used in these notes, does not imply the ideal perfec-
of the sanitarian, but is simply comparative.

Some of the facts set forth in this table require sp comment:—

1. The two districts having the highest death-rates those containing the largest percentage of foreigners. the Highland District, which comes third on the list i relative number of foreigners, ranks next to the O District in healthfulness. This must be attributed, measure, at least, to the location. The death-rate among foreigners living in the Highlands is but 17.8 per thous while that in the Waterhill District is 27.5. Among natives on the Highlands the death-rate is 15.1 per thous Among the same class in the Waterhill District, it is 2 The difference in the phthisis rates of these two districts matter of interest, in connection with the character of the

2. Wyoma District is one of those having a high d rate; yet it contains the lowest percentage of foreig Its phthisis-rate is remarkably low; but that from the prevalent zymotics is very high. The high death-rate of region must be accounted for by the mode of life of a po of its inhabitants.

3. Contrary to what might be expected, the mortality diarrhœal diseases is quite low in the crowded Central trict. This is perhaps due to the great number of a living there in proportion to the number of children.

4. The Franklin District is an average one for healthful But while its death-rates from diarrhœal and acute lung eases are low, that from phthisis is exceptionally high. In connection, what has been said of the natural drainage of region, and the general character of the soil, may be reca

5. The low rates from phthisis, and the three grou diseases in the Ocean District, which has a dry soil *a otherwise well conditioned*, are matter for observation.

I give next a table showing the death-rates of som the representative streets of the different districts, all b few of which have a population of more than 140. The long streets, and those which differ notably in the diffe parts, like Beach, Sagamore, Broad, Fayette, and others not given, for the reason that the death-rate, which is t mean of the sections, does not fairly exhibit the sanitary dition of any of them. Other facts of interest in this con tion are also set forth.

Streets with a Death-rate of more than 31. Very High.

NAME OF STREET.	POPULATION, 1875.		Death-rate, mean of Six Years, 1870 to 1875, inc.	DISTRICT.	Height of Street above tide-water, feet. Fractions omitted.	Nearest Whole No. of Inhabitants to each 100 ft. in length of Street.	Sewerage.	Natural Drainage.
	Natives.	Foreign.						
Murray,[1]	38	104	31.5	Waterhill,	15,	16	None,	Defective.
Harbor,[1]	36	207	31.6	Harbor,	4 to 8,	15	Sewer in 1872, 300 ft.,	" surface-drainage good.
North Federal,[1]	36	115	35.4	Waterhill,	13 to 27,	17	None,	Underdrainage defective.
Lynnfield,[2]	117	8	35.8	Wyoma,	66,	4	"	Good.
Amity,[1]	37	158	37.5	Harbor,	5 to 35,	32	Sewer in 1871,	Mostly good.
Pleasant,[1]	149	220	39.7	"	4 to 25,	17	Sewer in 1870,	Defective.
Waterhill,[1]	39	236	42.8	Waterhill,	12 to 20,	14	No sewerage,	Fair.
Allen's Court,[1] *	13	83	52.4	Eastern,	45 and less,	11	"	Good.
Fayette Court,[1] *								
Orange Court,[1] *								

* These courts are continuous, and virtually make one street. See map.

[1] Foreigners mostly Irish. Numerous hygienic defects observable in dwellings.

[2] Numerous hygienic defects observable in dwellings.

[NOTE.—The death-rates of streets, being based upon fewer data, are more variable as indications of sanitary condition than those which apply to larger numbers of people. When a sufficient number of years, however, are covered by the investigation, this difference, in a measure, disappears.]

Streets with a Death-rate of 22 to 28. High.

NAME OF STREET.	POPULATION, 1875. Natives.	POPULATION, 1875. Foreign.	Death-rate, mean of Six Years, 1870 to 1875, inc.	DISTRICT.	Height of Street above tide-water, feet. Fractions omitted.	Nearest Whole No. of Inhabitants to each 100 ft., in length of Street.	Sewerage.	Natural Drainage.
May,[1]	37	147	22.4	Waterhill,	14 to 18,	19	No sewerage,	Defective.
South Common,[2]	137	28	22.7	Common,	21 to 26,	6	Partial sewer, 1869,	Good; loose subsoil.
Grove,[3]	144	2	23.3	Waterhill,	20 to 40,	8	None,	Good and poor.
Shepard,[3]	308	69	24.3	Common,	5 to 22,	16	Sewer in 1868,	" "
Maple,[4]	326	28	25.	Glenmere,	44 to 74,	7	None,	Good.
Rockaway,[5]	184	122	25.1	Highland,	46 to 124,	21	"	Surface-drainage good; springy.
West Charles,[6]	148	38	25.3	Common,	3 to 7,	25	"	Defective.
Jackson,[7]	147	20	25.6	Eastern,	37,	8	"	Old part good; new, defective.
Smith,[7]	141	35	27.4	Central,	35 to 38,	29	"	Good.
Nelson,[8]	52	90	27.7	Waterhill,	9 to 15,	21	"	Defective.
Franklin,[9],	364	73	27.8	Franklin,	27 to 34,	17	Sewer in 1870, 924 feet,	Defective water-table 4 feet from surface in summer.

Streets with a Death-rate of 17 to 22. Average.

NAME OF STREET.	POPULATION, 1875. Natives.	POPULATION, 1875. Foreign.	Death-rate, mean of Six Years, 1870 to 1875, inc.	DISTRICT.	Height of Street above tide-water, feet. Fractions omitted.	Nearest Whole No. of Inhabitants to each 100 ft., in length of Street.	Sewerage.	Natural Drainage.
Whiting,[3]	138	12	17.	Franklin,	22 to 26,	13	Sewer in 1868,	Defective.
Ocean,[10]	142	24	17.2	Ocean,	29 to 45,	5	None,	Good.
North Common,[3]	177	58	17.4	Common,	21 to 24,	9	350 feet sewer, 1874,	"
Green,[3]	247	15	18.4	Central,	36 to 49,	15	None,	"
Adams,[11]	29	121	19.	Highland,	112,	16	"	"
Park,[3]	121	17	20.8	Franklin,	24 to 27,	9	Partial sewer, 1874,	Mostly good.
Howard,[12]	119	44	21.1	Central,	42 to 48,	17	None,	Good.
Myrtle,[9]	88	52	21.7	Western,	7 to 20,	7	"	Defective.
Liberty,[13]	78	78	21.7	Central,	16 to 52,	10	Sewer, 1873,	Part good, part defective.

Sachem,[14]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Neptune,[3]	230	57	13.7	Common,	6 to 17,	18	"	Good.
Mall,[14]	49	12	14.7	"	20 to 24,	5	"	Inhabited part good.
Brookline (and Court),[7]	71	79	15.4	Eastern,	21 to 31,	10	"	Good.
Newhall,[14]	210	20	15.5	Ocean,	13 to 35,	13	257 feet sewer in 1876,	Good.
Cottage,[15]	91	140	15.5	Waterhill,	8 to 12,	10	None,	Mostly good.
Baltimore,[14]	114	14	15.6	Ocean,	36 to 45,	11	Sewer in 1876,	Good.
Nahant,[14]	186	34	16.2	"	40 to 47,	10	None,	"
Union,[13]	568	242	16.7	Central,	9 to 44,	23	Sewer, 1866,'67,'69, and 1873,	Variable. Good and bad.

Streets with a Death-rate less than 13. Very Low.

South,[3]	169	31	7.2	Common,	6 to 20,	9	None,	Loose subsoil; mostly good.
Acorn,[5]	26	98	7.2	Highland,	112 to 132,	27	"	Good.
Lowell,[3]	159	13	8.3	Common,	7 to 14,	16	"	Loose subsoil; mostly good.
High,[14]	86	9	9.2	Central,	42 to 54,	16	"	Good.
Portland,[14]	37	2	9.7	Ocean,	42 to 48,	9	"	"
North Franklin,[7]	122	14	10.4	Franklin,	34 to 47,	15	"	Surface-drainage good; underdrainage def.
Bassett,[3]	93	20	11.	Ocean,	42 to 45,	12	"	Good.
Silsbee,[7]	192	46	11.2	Central,	31 to 38,	23	"	"
Vine,[3]	181	12	11.2	Common,	17 to 24,	12	"	Loose subsoil; mostly good.
Johnson,[14]	255	28	11.9	Franklin,	20 to 28,	17	Stone drain,	Rather poor.
Atlantic,[14]	97	19	12.4	Ocean,	41 to 51,	13	None,	Good.
High Rock,[14]	132	26	12.4	Highland,	40 to 111,	10	"	"
Lake,[9]	174	20	12.8	Glenmere,	51 to 56,	11	"	"

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[1] Foreigners mostly Irish. Numerous hygienic defects observable in dwellings.

[2] Some of the dwellings are old, and apparently in poor condition.

[3] Dwellings appear in good condition.

[4] Some defective dwellings.

[5] Foreigners mostly Irish. Apparently good houses.

[6] Many colored people.

[7] Dwellings average.

[8] Foreigners mostly Irish.

[9] Many good dwellings, some poor.

[10] Dwellings mostly good. Many wealthy people.

[11] Foreigners mostly Irish. Some dwellings defective.

[12] Dwellings variable; some good and some poor.

[13] Dwellings mostly good; a few poor.

[14] Dwellings good.

[15] The street has a good appearance.

All the districts contain some streets that exhibit a hig
death-rate, and others which exhibit a low one. It is th
predominance of one or the other of the classes which give
the character to the district. The highest rates are shown i
connection with water polluted by drainage. Witness th
three courts on the borders of Silver Lake; Waterhill Street
which runs along the lower course of Strawberry Brook; an
Pleasant Street, near the polluted harbor and creek. In a
of these places, however, there are prominent hygienic defect
in the construction and management of many of the dwellings
Privies are unclean, piggeries abound, and intemperance is no
rarely observed among the inhabitants.

Although foreigners predominate in many of the mos
unhealthy streets, it is measurably certain that this fact alon
cannot explain their unhealthiness; for we find, on the on
hand, certain streets, as Lynnfield and Bacheller, the inhab
itants of which are nearly all natives with a high death-rate
and, on the other hand, certain streets, as Acorn and Cottage
with a low death-rate, the inhabitants being largely of foreig
parentage. Nor can the height of the land above the level o
the sea furnish the full solution of the problem; for some o
these streets having a low rate of mortality are on the border
of the marsh, although possessing a comparatively dry soil
Our investigations have furnished no evidence that residenc
near a clean salt-marsh, on land which is itself well drained
is very unhealthy. The case is far otherwise, however, whe
the marsh is polluted by sewage.

A careful survey of all the facts adduced has convinced th
writer, that in a contamination of water, soil, and air b
accumulated filth,—in intemperance, careless habits of living
and general neglect of sanitary laws (influences which, whe
operative, affect natives and foreigners alike), combined i
not a few instances with natural unhealthiness of site, mus
be found the explanation of the great variation in mortalit
between the different streets and districts of the city. I
foreigners suffer more than natives, it is not because of an
predisposition to disease, of any constitutional weakness o
the races, or difficulty in becoming acclimatized, but becaus
they are more exposed to the operation of the causes abov
mentioned.

VII.—CONCLUDING REMARKS.

Notwithstanding the fact that the general death-rate of the ty is, on the average, not very high, there is an urgent and nmediate necessity for sanitary work. That this is the case, nd that the necessity applies to the city as a whole, will be pparent from the following considerations :—

1. In certain streets and sections of the city there exist any removable causes of disease, and as a consequence a rge excess of mortality.

2. The healthy portions suffer, in a measure, with the un- ealthy. Infectious diseases, which find a permanent abiding- lace amidst the filthy privies, sink-holes, and pigsties of the tter, spread at times into the former, no amount of cleanli- ess and care forming an effectual barrier to their entrance. ence it is that families which conform the most nearly of ny in the community to the laws of health, are sometimes estructively invaded by scarlatina, diphtheria, typhoid fever, nd similar diseases.

3. Serious sanitary defects, themselves the immediate cause f disease, are not unfrequently found lurking under the fair xterior of our best houses. The death-rate of the healthiest nd best-conditioned districts is thus rendered greater than it ould be.

4. The aggregate loss from sickness and death may be said fall upon the community sustaining it as a whole. It cer- inly lessens production, increases pauperism, and in various ther ways checks material growth. It is not necessary to nter upon any labored calculations, as some have done, to btain the exact measure of this loss in dollars and cents. uffice it to say, that it forms a vastly greater burden for the oulders of our people than the taxation of which they so uch complain. An organized and determined effort to minish this loss would be evidence of wisdom.

It is now proposed to state briefly what are conceived to be e most pressing sanitary needs of the city, so far as they ome within the province of public hygiene. This is partly r the sake of bringing in certain general suggestions as to the remedial measures to be employed, and partly by way recapitulation.

1. *More Attention to Soil-drainage.*—An illustration of t good that might be accomplished by the city in this directi is furnished by the case of Bog Meadow. The map sho how readily, by deepening the channel of Stacey's Brook, a the construction of lateral tile or stone drains, this bog mi be deprived of superfluous moisture. Were it done, an a of waste marsh-land would be converted into a producti garden; and the residents on its borders and along the cou of Stacey's Brook could underdrain their wet lands with t greatest ease, thus removing one of the causes of phthis and possibly of other diseases. Similar results might attained in other parts of the city.

2. *An Improvement in the public Water-supply.*—T amount stored should be increased, so as to allow of th natural purification which results from long standing. If t water were thus rendered clear and colorless, the change wou probably lead to its universal use, and an abandonment of t wells, which experience has shown so liable to contaminati As an aid to this purifying process, the storage-basins oug perhaps, to be thoroughly cleansed of all decaying orga matter. It is not pretended that the color now possessed the water indicates anything harmful in its constitution, b it is, on this account, unacceptable to great numbers of t people; and it will remain so until this seeming defect remedied.

3. *A better System of Sewerage.*—The sewers are too f in number, and destitute of the means of ventilation. T disposal of the sewage is highly objectionable. Under th head may be mentioned the necessity which exists for pr venting factories with an offensive sewage from discharg it on the surface of the ground, or into streams which nev receive flushing.

4. *An improved Method of disposing of Night-Soil a the Contents of Cesspools.*—To accomplish this, it is necessa to substitute a better form of privy for the miserable affa now in use. With the abundance of coal ashes everywhe to be obtained, there would be little difficulty in carryi

ut the pail-closet system so successfully used in Rochdale, ngland.[*]

While cesspools are necessary, as they must be for long ime to come, in many portions of the city, they should be nade water-tight, and emptied in the most approved manner.

6. *A better System of removing Garbage.*—Almost any hange from the present plan would be an improvement; but he work should be done in a specified manner, by contract-rs, under the direct supervision of the health authorities. his would be the means, in a measure at least, of abolishing iggeries, thus doing away with another form of nuisance.

7. *More Attention to the Subject of Ventilation.*—Although his is largely a matter for individual management, yet in the ase of shops, school-houses, etc., the city has an obvious luty to perform.

8. *A more effectual Plan for limiting the Spread of certain ymotic Diseases.*—There is no good reason why scarlatina, liphtheria, and other less prevalent diseases, should not be lealt with as carefully as small-pox. They are relatively as atal. Scarlet fever caused, in 1875, nearly four times as nany deaths as small-pox in ten years. Our experience of he terrible ravages of diphtheria is too recent to require any nention to be made of that. Epidemic dysentery has been ery destructive to life in former years, and it may visit us gain. People would soon become reconciled to the ideas f registration, isolation, and disinfection, when once con-inced of the good to be accomplished by such measures.

But by far the most urgent need of Lynn at the present ime is—

9. *The establishment of an Independent Board of Health,* lothed with authority to decide and act in regard to all the anitary interests of the city. This would be in itself a pos-ible remedy for all the evils that have been mentioned. By he report of the auditor for 1875, it appears that the expend-tures of the board of health for the year were $47.59. This or a city of 32,600 inhabitants, and losing hundreds of thou-ands of dollars every year by preventable sickness and death! t is idle to expect that under the plan now in operation any

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[*] See paper by Dr. F. Winsor, in Seventh Annual Report of the State Board of ealth of Massachusetts, p. 182 *et seq.*

abuses will be corrected, or improvements made. The members of the board of aldermen, who are intrusted with thes important matters, are not selected on account of their qualifications as guardians of the public health; and burdened a they are with legislative and other duties, it is hardly matte for reproach that they give little or no attention to that worl which ought never to have been required of them.

REGISTRATION OF DEATHS AND OF DISEASES.

By CHARLES F. FOLSOM, M. D.,
Secretary of the Board.

REGISTRATION OF DEATHS AND OF DISEASES.

One of the leading sanitarians of the United States recently said, "No method has yet been found, or at least acted upon, whereby the actual death-rate can be positively ascertained for the United States, or, so far as I know, for any single State."*

It has seemed desirable to ascertain how we stand in reference to so sweeping a criticism, and the result of the inquiry has been that we can only say that we are a little better than some of our neighbors.

The first of the following series of questions was sent to the medical correspondents of the Board in October; and the second, a little later, to the clerks of the cities and towns throughout the State:—

I. Is the registration of deaths and causes of death complete and satisfactory in your town? If not, please suggest any deficiencies of which you are aware, whether *all* deaths are returned to the undertakers, whether the undertakers themselves return them promptly and accurately to the clerks, whether causes of death are reported by the physicians in all cases, etc., etc.?

II. Will you be kind enough to inform us whether the registration of deaths and causes of death is complete and satisfactory in your town? If not, please suggest any deficiencies of which you are aware, whether *all* deaths are returned to the undertakers, whether the undertakers themselves return them promptly and accurately to the clerks, in what proportion of cases the *causes of death* are reported by physicians, etc., etc.?

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* Report on the Death-rate of each sex in Michigan, and a comparison with Dr. Farr's Life Tables of Healthy Districts in England. By Henry B. Baker, M. D., Secretary of the State Board of Health and Registrar of Vital Statistics of Michigan. 1876.

INFORMATION FROM PHYSICIANS.

One hundred and ninety-six physicians replied to our ci lars. Of these, 44 reported that the registration is satis tory, 118 reported that it is not satisfactory, and 34 replie indefinitely that it was not possible to say from their ret whether the law is complied with or competent to mee requirements, if obeyed, or not.

In regard to the registration of the full number of dea without regard to their causes, 54 have reason to think this is fully done, 45 reply that it is not done, and 97 ans indefinitely; that is, they do not answer that particular q tion, they have no suggestions, they do not know, or reply is so worded as not to convey a definite statement.

The very large number of "indefinite" answers as to registration of the full number of deaths, may be explai on the ground that it is a question on which comparatively have an opportunity of getting exact information.

Of course, it is not expected that absolutely "satisfacto registration can be got in all cases. The word, therefore tabulating the returns, has been used to express as satis tory a registration as we can expect with the present deg of human imperfection and until we have some system or regulating the practice of medicine. For instance, the lowing two replies (10 and 26, p. 235,) were classed as "sa factory." Strictly speaking, the first indicates a condi of things which is very far from "satisfactory"; and importance of some legal restrictions upon irregular incompetent physicians is great. In tabulating the retu however, it was thought best to confine attention to th defects which were referred to in the circular sent out.

It would be very easy, however, to have a registratio physicians in our State, as has been done in Europe and some of the cities of our own country, notably Brooklyn New York. In such case, any person not possessing a dip ma from some responsible medical college should be exclu from the privilege of signing any medical certificate involv responsibility.

A certain portion of the community will always prefe consult "healing mediums," etc., and probably could not prevented from so doing by any law; but it is of importance to the State that every death should be as faithfully and intelligently certified to as is possible, and the public should see to it that this is done in every case.

10. In this town, as in nearly every town in the Commonwealth, we have some irregular and incompetent practitioners of medicine, whose diagnoses would be of doubtful accuracy and not to be relied on for scientific conclusions. Yet the registration of deaths and causes of death is as complete and satisfactory in this town as in most towns probably.

26. The registration of deaths is apparently quite complete. The *cause* of death is not always correctly given, owing oftentimes to an impossibility of obtaining an autopsy. Probably the returns to the undertakers are as complete as they could be made by any legislation.

Nothing would be gained by quoting affirmative replies at length; enough of the others are given to illustrate all the deficiencies in the present methods.

Our correspondents generally testify that the town clerks are ready to heartily coöperate in the work of good registration, and that, where there is any deficiency on their part, it is from following established custom or from inherent difficulties.

Replies of Medical Correspondents.

1. The registration of deaths in this town is quite complete and satisfactory, with perhaps the exception that the *cause of death* is reported in too general terms, a matter that can be easily remedied by physicians making the report, which is not done in all cases now. The deaths are returned by the undertaker to the clerk once a year; this, perhaps, is not as often as it should be done, but such matters, I think, cannot be attended to conveniently with that promptness in country places as in cities.

2. I presume that our town authorities are not remiss in reporting all cases of death, but are certainly not over-particular in the minutiæ of the subject,—in fact, have not in a single case referred to me for such particulars.

5. Undoubtedly the number of deaths is given the clerk with sufficient accuracy, but the causes of death in many cases must be quite imaginary, as the physicians are not consulted about this.

7. The cause of death is invariably returned on the undertaker's certificate and is given by the friends of the deceased. I am never asked to make out a physician's certificate.

9. In a few instances, decedents are taken to other places for burial without the town clerk's license [and probably escape registration].

17. I think all deaths are returned, but I think that the value of regi
tion is essentially impaired by wrong causes being reported, usually thr
ignorance; there is evidently no intentional misrepresentation. Pe
the physician's signature accompanies about two per cent. of all certific

18. It has been the custom for the undertaker to take around, *once or t*
year, to physicians, their blanks, filled out in other respects, and ge
attending physician to certify. If not disposed, they have filled them
themselves.

19. The registration of deaths and their causes in this town is very *in*
plete and *unsatisfactory*, and I am aware *all* the deaths are not recorded.
custom has been for the town clerk to go through the town once a yea
"collect the births and deaths"—while during the year many birth
deaths have occurred in families who have removed from town; c
quently no record can be made of them. There being no particular u
taker, I think no one ever makes any return to the clerk, and I thin
cause of death is never reported by any of our physicians. I have long
aware of the unsatisfactory manner and incompleteness of the registr
of deaths and causes of death, not only in this town, but in many
towns.

24. Since I received your circular I have had an interview with the
clerk. He says the registration is all a farce. I inquired how he pro
his information, and he said it was supposed he would send to every h
but I think he takes the neighborhood reports.

24½. The undertaker usually puts down the *cause* from hearsay of
than he ascertains from the attending physician the real cause.

25. I think the registration of deaths is generally made quite prom
but the undertakers are not careful enough to inquire of the physicia
to the causes of death, and one often sees names given which are altog
outside of medical nomenclature. The physicians are equally careless i
same thing, and one would often be in doubt to know what the true cau
death was, unless they had attended the cases themselves, as our y
death-list will testify. The law does not oblige a physician to give the c
unless applied to for it, and then he is liable to a fine of ten dollars
does not make the return in fifteen days. I think an improvement c
made by obliging the physicians to fill blanks in a scientific manner
return them to the clerk without having the undertaker as a medium.

28. I would suggest as an amendment to the statutes on this subject,
no interment be allowed to take place, under a severe penalty, in any tov
city, without the certificate of the clerk of the town or city in which
death occurred (or the deceased resided) *having been first obtained.* T
seems to me to be no necessity for any exceptions.

34. In a full practice in this town for more than *forty-four years* I
never been asked for the causes of death, nor have I ever so reported.
do not have, in the country towns, "undertakers," and of course no ret
of such persons have been made to clerks.

35. There are a considerable number of cases of death among the foreign population who die without any regular medical attendance. I have supposed they were reported by the sexton as *deaths*, but the *cause* of death would often be random *guessing* on the part of relatives.

36. I have never been called upon to give the causes of deaths, and therefore cannot say whether they are accurate or not.

37. The registration of deaths, and the causes of death, in this town, has been very imperfect; and, as far as sanitary purposes are concerned, worse than useless. Last year I made a formal protest to our selectmen, the registration was so incorrect, especially as to the *causes* of death, more than one-tenth being recorded incorrectly. The undertaker has been in the habit of asking the friends the "cause," and once in two or three months reporting to the town clerk. Of course such statistics are worse than useless. Statistics, to be of any value, should be themselves correct. This year I have been asked in a few cases to certify as to the cause of death; for several years past, not once. There ought to be a law compelling the sexton to require of the physician in charge to certify to the cause of every death, *before* interment, with a penalty attached for non-performance. No respectable physician would ever object to doing this. The law now is, I believe, that the physician shall give a certificate when required to do so; but no one is compelled to make the request. No body should be removed from town, or interred, without a proper certificate of the cause of death from the attending physician.

39. Many times the physician never sees the return at all. The statement of some member of the family is all the authority. I don't think, during my practice, that fifty per cent. of the deaths were returned in a proper manner.

43. The registration of deaths in our town is done after a poor fashion. Near the end of the year, or rather, near the time to make the annual returns, the town clerk himself, or some one for him, goes around and "picks up" all the deaths he or she can hear of; the cause of death is learned from friends or neighbors. I do not, nor does any other physician, make any returns to the clerk, in our town.

44. The registration of deaths here is not satisfactory. There is one undertaker, and he is negligent in this matter, frequently letting the half-filled blanks remain on his hands and accumulate till the end of the year, then getting the physicians to certify to the causes of death from memory, which in many cases involves inaccuracy. I do not know but all cases may be returned, but I do know, that by reason of the slack way in which it is attended to, there is much guesswork in the final report when it is made up.

47. Before burial in our cemeteries, it is of course necessary to secure a permit from the city authorities, and so far the registration is complete. Whatever return there is of the *cause* of death comes from the undertakers, and from them alone. I do not remember to have been asked the cause of death in more than two or three instances for many years. The undertakers prepare the statement from reports of friends. The city clerk informs me that there is much delay in the sending in of these reports, generally requiring his

personal attention to obtain them, and then not very satisfactory in every case.

48. I can unhesitatingly say that the registration of the *causes* of deaths is *anything* but satisfactory. I think there is no doubt but that all deaths are recorded.

49. The registration of deaths in this city is complete, in so far that the total number is correctly returned. It is not satisfactory, in that there is some confusion in the important item, "cause of death." It has been customary for the undertaker to fill up the blanks, generally without consultation with the attending physician, relying upon friends for his information. In cases which he considered doubtful, the physician is sometimes called upon for his opinion, and to fill the blank. In the cases in which the cause of death is given to the satisfaction of the undertaker by friends of the deceased, he inserts the name of the physician, though he has not seen the certificate. I have to-day examined the certificates returned to the clerk's office for a couple of months past, perhaps fifty in number. The name of the attending physician has been inserted in all, but in only two or three instances by himself.

50. The registration of deaths and causes of death is, I think, very unsatisfactory, so far as our city is concerned. I think, however, that but few deaths escape registration. So far as "causes of death" are concerned, the record is of comparatively little value. The undertakers almost never take the certificate of return to the physician who attended the deceased for his signature of cause of death, but put down as cause of death whatever the family say the doctor said was the cause. I got the returns of the last year from the city clerk to look through, to find out about some of these things I have mentioned. We have a yearly mortality of about two hundred or more at present. I think there were obtained, last year, three certificates of death with signatures of physicians, out of two hundred.

A case of "chronic rheumatism" was cirrhotic kidney; a case of "ulceration of the bowels" was cancer of rectum; a case of "heart-disease" was septicæmia or pyæmia, following amputation for old disease of knee-joint; a case of "tumor" was aneurism of the aorta. "Infancy" is down for twelve deaths, etc., etc.

I have been trying to do something to make our registration better, and the city clerk has seen the undertakers, and they agree to take their certificates of return to the physicians for their signatures. I brought up the subject in our local society, but I did not succeed in getting the members interested apparently; nobody, with one, perhaps two exceptions, seemed to care anything about it.

51. If the law provided that no burial could take place without the possession by the proper authority, of a certificate of the cause of death from the attending physician, it would seem that some of the faulty and unsatisfactory "causes of death" might be avoided.

55. As far as I can learn, both from my own experience and from inquiry of the clerk of the town, I think it (registration) has been done in an imperfect manner, and necessarily, from the fact that the returns have been made once a year.

56. So far as my experience and knowledge of registration of deaths extend, it is far from satisfactory; and this, I believe, is mainly due to neglect on the part of the undertakers in complying with the requirements of the law. Certificates of death are generally sent in some weeks and sometimes months after burial. I always attend immediately to the filling out of certificates on receiving them. I have now upon my desk two that have been there several weeks awaiting the call of the undertaker.

57. I am not called upon in half my cases to give the certificate. I understand that undertakers get them filled by the family, and I know that many certificates are wholly false as to cause of death. Almost any cough is reported either "consumption" or "lung fever," and so in other diseases.

61. The method of registration for this town is as follows: Two persons dig the graves and drive the hearses. These persons, at the end of the year, go about town and visit every house in which they learn of a death or birth having taken place during the year. The name, age, disease of which the person died, etc., are put down, and all are returned to the town clerk. The record is, therefore, made up wholly of the statements of the families in which the person died. Physicians make no return whatever. In a few instances, families, if uncertain of the causes of death, refer the sexton to the physician. More commonly they are better satisfied to give their own opinions than those of the physician, if they do not happen to coincide. Hence the record cannot be very accurate. In looking over the records for various purposes, I have been very much dissatisfied at what I found in many instances assigned as the cause of death in cases that I had treated.

66. The undertaker fills out the blanks relating to causes of death, according to the dictation of the family. When the disease is obscure or peculiar, the physician is consulted to give the name of the disease, but this is often loosely done. I am not able to report as to the promptness of returns to the city clerk.

67. So far as I can learn, all the deaths in this city are reported except *still-births*, of which I find no record. The city clerk informs me that the undertakers are generally prompt in their returns. Physicians do not make out certificates of the causes of death at all, that I can learn of, though on half a dozen returns rendered this year, I find the physician has filled out the cause-of-death blank (on the undertaker's return), and signed his name in the space left for the name of the attending physician. In 60 of this year's returns the name of the physician is given, but his signature is not attached. In 134 of this year's returns the name of the physician is omitted. The cause of death in many cases is obscurely or incorrectly given, as "weakness," "cut with a knife," "accidental," "inward spasm," "cold," "troubled in the brain," "dropsy," "debility," "teething," etc. One return has the honest record of "don't know," which indeed causes many deaths. I would suggest that it be required for the physician to fill out and sign, in every case, the cause-of-death blank on the undertaker's return before it is handed in to the clerk.

71. Causes of death are never, or rarely, reported by the physicians of this town. The clerk makes up his report upon hearsay testimony, never asking information of the physician in charge of the case. I have known "puer-

peral fever" returned as "typhoid," or, in another case, as "lung fever.
far as my observation extends, in this and many other country towns in
ern Massachusetts, very little dependence can be placed upon the stat
of causes of deaths as returned by town clerks. Undertakers never re
any certificate from attending physicians. I would suggest that it be m
penal offence for an interment to occur without the undertaker having
tificate from some respectable physician, and that a further penalty be
if the undertaker fails to return this certificate to the town clerk.

74. As I have been town clerk for the last twenty years, I can speak
personal observation, and, when I say that the death-returns are incom
and unsatisfactory, I only say what I know to be the truth. In fact, in
forty deaths returned the past year, I did not find five certificates from p
cians, notwithstanding I had been careful to furnish them with a full su
of blanks for the purpose. As a matter of course, the great object in
is, to a great extent, lost. The number of deaths is promptly retu
according to an understanding with the sexton, and, if physicians would
meet the requirements of law, our returns would become reliable. The
remedy which suggests itself to me at this moment, is, that a certificate
the clerk to the sexton, that all the requirements of law had been com
with, should be furnished *previous* to burial, and that the sexton sha
prohibited from making burials without such certificate, under penalty.
efficient remedy should be applied soon in order to render the returns
able.

75. I think the registration of deaths in this city has improved si
referred to it in a communication to you a year or two since. I have t
occasion to urge upon the undertakers the importance of obtaining the wr
statement of physicians in relation to the causes of death. Formerly i
customary, and it is practised, I fear, to some extent now, for the undert
to take the statement of the friends of the deceased in regard to the cau
death, without consulting the attending physician. Most of the underta
however, submit the proper blanks to the attending physicians to be fill
them. It often happens, particularly among the poorer classes, who ar
able to employ, or do not choose to employ, a physician through the cou
a disease, that a physician is called, perhaps once, to prescribe for a pa
and, after that, his services are not requested, and the patient, after the
of an indefinite period of time, one, two, or more weeks, dies. When
return is made out by the undertaker, he may apply to the physicia
the nature of the disease, but it is often quite impossible for the phys
to state accurately the immediate and sometimes even the remote
of death. In consequence of the great diversity of skill among those
have the title of "Doctor," in this land of medical liberty or license
nomenclature employed in reporting deaths is sometimes very inaccurat
indefinite. I note the following causes of death in the city clerk's reg
for the present year: "Teething," "worm fever," "pharalithic rheumat
"canker," "jaundice," "pelvis malformation." There are, however, few
such indefinite terms employed, than might be expected. I have reas
believe that all deaths are reported to the undertakers, and by them prom
returned to the city clerk.

78. I am never called upon in any way to report upon the causes of d
—at least have not been in late years.

78½. Our undertaker is a man of thirty years' experience; in early life a carpenter by trade; does not belong to any temperance society; he often has the difficult duty of deciding the *cause* of death from viewing the *cadaver*, and he makes his returns in conformity with his own inquest.

81. Could the public mind be educated up to the point of compulsory autopsies in all cases of death, such autopsies to be performed by duly qualified, legally appointed medical officers, would not both the science of medicine and the art of healing make large advances in our midst during the next half century? What accomplished diagnosticians would arise as one result of such a measure! But this is a Utopian idea; a thing to dream of, but never to be practically realized in this country. I may say, in conclusion, that the registration of *deaths* is "complete and satisfactory," at least very much so in my town. But the registration of the "*causes of death*" is not satisfactory; that is, much less satisfactory.

83. I have practised in this town five years, and have *never* been called upon for certificates of death during that time. The reports of the deaths in the town appear yearly in the clerk's report, but his information is derived from other sources than through physicians.

84. During the past two years, of all deaths returned, not one in three was signed by any physician.

88. The undertakers make prompt returns, but the physicians are not prompt with the *cause*, and the town clerk is obliged to hunt up the cause before the end of the year. In regard to still-born children, if any undertaker is called, he makes a return; if, however, the friends bury the child, no return is made.

89. Cases have occurred in the past, where the body has been taken just across the line into Lawrence, and no return made to the clerk here.

91. All deaths are supposed to be returned; but the causes of deaths, *as returned*, are frequently very unsatisfactory; about one-half are judged to be misnamed.

93. The clerk said, further, that he found it very difficult, in many cases, to obtain the facts and information necessary for him to make the records on the town books complete. Some would be attended by physicians out of town; other families would move out of town soon after a death, without making or leaving any record of the death or cause of death for the clerk. Transient persons, shop hands, etc., would sicken and die suddenly, their friends would come and take their remains to some distant place for interment, without making any returns of the death to the clerk.

94. I had a talk with the town clerk this morning, and he informs me that returns of deaths are not made promptly by the undertakers to him, and that only myself and one other physician make out certificates of causes of death. There are four practising medical men here, and no one but myself appears to be in the practice of making out a certificate immediately after the occurrence of a death. The principal undertaker seldom calls for a certificate, and, the doctors only being required by law to give a certificate

when it is called for, the whole matter is neglected in a majority of the deaths. The present town clerk appears to have tried to get his returns in promptly, but the undertakers and the medical attendants have been careless and remiss.

95. Empirics, often grossly ignorant, report causes in a large proportion of deaths; these reports are received on a par with those of the educated physician.

96. To my mind the registration of deaths and causes of death in this city is not at all satisfactory or complete, when viewed from a medical stand-point. In fact, as far as statistics or the use of such registration in matters affecting the public health are concerned, the matter is a mere farce. I have no means of knowing whether *all* deaths are returned to the undertakers or not. Upon inquiry of the undertakers, I find that they make their return to the city clerk once a month, and that, as a rule, they obtain their knowledge of causes of death from inquiring of the family. Certificates of the causes of death are not given in this city by any physician, they never being requested to do so.

98. In regard to the registration of the *causes* of deaths, there is room and good reason for making a radical change. In a majority of instances, the undertaker makes his return, giving the cause of death and the name of the attending physician from information obtained from the parents or relatives of the deceased. I have in mind an instance which has occurred within ten days, where the cause of death was reported as "pneumonia," and I know, from personal examination, that the party died from "phthisis." It seems to me that in order to obtain a correct registration as to causes of death, and have a report that would be reliable on which to base a statistical report, that it should be made obligatory on the part of the physician in attendance at the time of death of the patient, to sign, in his own handwriting, the undertaker's return, as to the cause of death. Some way should be devised to prevent the undertakers from making their returns, without first obtaining their information as to causes of death from the physician in attendance. As the returns are now made, there is no responsibility on the part of the physician; it is left entirely in the hands of irresponsible parties, and, of course, the attending physician is the only one qualified to make a correct return.

99. I think the attending physician is very seldom interrogated in relation to the matter, and do not know that I ever was. A nearer approximation (I think) would be made to the truth, if every physician were obliged to furnish a certificate to the undertaker or to the clerk of the town, for a record of each death that may occur in his practice, with a penalty, should an undertaker officiate without such certificate.

100. The town clerk informs me that the registration of deaths and the causes of death is *incomplete;* that at least one corpse a month, on the average, is removed from town without any return being made, either of the death itself or of the causes of it.

101. I called upon our undertaker. He informs me that all deaths are returned to him, and he returns them to the clerk. It is not his custom to

call upon physicians in all cases for the cause of death, but takes the statement of the family unless they refer him to the physician. I have no suggestions to offer, but it seems to me the statistics would be much more valuable, if, in every instance, the cause of death was certified by the attending physician.

103. The registration of deaths and causes thereof is satisfactory and correct, so far as I can find out, except that the undertaker or friends of deceased often neglect to present the return of death to the attending physician for his opinion of cause of death and signature, but fill it in themselves, so that omissions and mistakes are frequent. I do not think that I have signed more than half the returns of deaths which have occurred in my own practice for the last eight years.

105. I am seldom asked to fill out a blank, and know but little of the reports.

108. The town clerk's record is well kept, so far as he can be expected to keep it; yet even in the record are evidences that the neglect of the law relating to physicians' certificates occasions much looseness in the record of the causes of death. The law in relation to physicians' certificates, I am informed, has never been enforced here. The town clerk also states, that in his yearly round for obtaining the births for registration, he has occasionally heard of a death which has not been reported to him. Another irregularity has been permitted in allowing undertakers of the neighboring city of Salem and those of the adjoining towns to make their returns of deaths at which they have officiated, semi-annually.

109. I have never been asked to make a certificate of death and the cause of death for any one who has died in this town.

113. It would be an important improvement in the present law if the physician's certificate of cause of death were required *in all cases, without exception*, previous to interment, and cemetery authorities were forbidden to permit any interment except on presentation of an order or certificate from the town clerk. I cannot ascertain that any unrecorded interments have been made here the past two years; but such an occurrence is not at all impossible under existing regulations.

122. The causes of death are at present registered with commendable painstaking by our municipal officers. Only a very small percentage of deaths are registered without a statement of the cause certified to by some medical attendant. But the provisions of the law last enacted to secure a registration are not strictly observed. From the nature of the work, I think the registration of causes of death should be at least subject to the supervision of a medical officer. In our cities this could be made one of the duties of the city physician. Moreover, tables should be furnished to the recording officer and to physicians, indicating the general classification which is to be followed. I think that for the purposes sought through this registration, only a general classification should be attempted. A minute classification is likely to prove useless from the mixture of inaccurate diagnoses from ignorant practitioners, with the opinions of careful observers.

123. The town clerk employs a man to canvass the town every y
collect all the statistics and report to him at the beginning of the year

125. The town clerk informs me that there are a few returns whic
not adequately filled. I cannot control returns of deaths of cases und
care of other physicians, but I am in the habit of calling at the off
the town clerk every year before he forwards his returns, and of assi
him, as far as possible, in making them complete in my department.

131. The registration may be complete, yet I think not wholly
factory—the physician's certificate frequently not being called for
several months have elapsed since a death, and then the circumstance
fully in mind. To decide whether such registration is satisfactory or
would first know the object of any registration. If for the basis of s
tical tables of causes of death, prevalent diseases, etc., I should say n
to satisfy the public whether the death was from disease or violence, I s
say yes.

133. The registration of deaths and the causes of death in this to
very incomplete; beyond the fact that the person is dead, it is of no u
at all. My impression is, that to be of any use, some uniform method s
be established throughout the Commonwealth, making it the duty o
attending physician to make and return to some proper officer, within
tain time, a certificate of the death, its immediate cause, etc. As lo
every case of diarrhœa in children is called "cholera infantum," and
case attended with cough "consumption," every sudden death "hear
ease," what sensible man can peruse the record with confidence?

136. I see but *one* way to make the "returns of death" complete an
isfactory; viz., forbid by law, under penalty, the interment of any bo
any cemetery, or transportation in any public conveyance, without a c
cate of death signed by a physician, countersigned by the town clerk or
other responsible officer; this certificate to be retained by the pers
charge of the cemetery or public conveyance, and returned to the o
issuing the same. The person issuing the certificate to be forbidden to
it unless he has in his possession a certificate of death of approved form
signed by a physician. I have tried all other means, and am convinced
in this city no other plan as feasible will succeed. Many certificat
death have been signed by the undertakers, or not signed at all, an
returned in a lump at the end of the month. Notably is this the case
certain undertakers. The objection that has been urged against enfo
this law, or in fact any reasonable regulation, is, that it is difficult to
the doctor to sign, etc. Pass a law requiring every physician to send t
clerk or other official a certificate of the cause of death within twenty
hours of death; the city physician or health officer to furnish a certif
if no physician is in immediate attendance. I am glad that some inve
tion is being started about this matter.

137½. The same idea (of requiring certificates from physicians) v
lead us to prefer that all practitioners should be compelled to have dipl
or certificates of competency before being allowed to follow their profe

141½. The town clerk thinks some undertakers fail to get and retur
required reports, so that some deaths fail of any registration whate

others return promptly. Generally, the causes of death are not reported by physicians, but are obtained, as best they may be, from friends' or neighbors' reports of physicians' opinions; often, of course, ill understood and improperly reported. In some cases, the attending physician's name appears as having certified the cause of death, when he has really certified nothing, and only because he was known to have attended the case. Thus my own name appeared as certifying as cause of one death, "Fall at Purgatory"!

142. Out-of-town physicians, as well as resident physicians, have never returned any deaths, nor causes of death, except when the body was to be buried away from this place. For a period of sixteen years I have never been asked nor required to sign a certificate as to the cause of death, except as above stated.

142½. I believe that the nature of the disease or the cause of death is in seventy per cent. of cases mere guesswork. These returns form in many instances the bases of theories from which sanitarians deduce the most positive conclusions.

143. For two years I have neither filled out one [death-certificate] nor even seen one. For aught that I know they may be now obsolete.

147. I have thought that our high death-rate from consumption, as shown by statistics, might perhaps be accounted for in a measure by the fact that the undertaker sometimes, in what he considers a clear case, fills out the blank.

148. The registration of deaths and causes of death here is more satisfactory now than it was a few years ago, and it is intended by the present clerk to make it complete and satisfactory. I think the deaths here have all been recorded. The criticism I make is, that probably the former clerks have sometimes listened to common report as to the cause of death, and so, many of the deaths are recorded "consumption" which are due to other causes. On examining the records for sixteen years ending with 1870, the deaths recorded number 563. Of these, 153 are recorded as caused by consumption, making 27 per cent. of the whole. Comparing this with the years 1871 to 1876, inclusive, to the present time, the deaths recorded number 187. Of these, 27 are reported as caused by consumption (14½ per cent.).

149. The returns of deaths to the undertaker, and the registration of such deaths, have never, at least since my residence here (twenty-three years) been in any degree satisfactory. Such returns, except in individual cases, have been literally valueless. The sexton will ask, either at the time of the funeral or some indefinite time later, some one of the family, What did the deceased die of? and make his return in accordance with the answer and his own ideas of the case, the result requiring an entirely new nosological system to comprehend.

150. The registration is inefficient and unsatisfactory; and principally because of the loose and indefinite way in which the physicians of the town and vicinity record their deaths, the nosology being defective and the cause often omitted as a trivial affair after all. I do not think *all* deaths get recorded, but most do. The undertakers are very prompt to ask for the certificates, but do not always readily get them.

152. I think the value of the returns is much diminished by the cer
cates of irregular and ignorant practitioners being received, but as a
attend quite a large proportion of the sick everywhere I see no pre
remedy.

153. From inquiries, I judge that all deaths are returned to the un
takers, and quite promptly by them to the town clerk. The certificates
fully made out, but I find that the undertakers seldom obtain the name
the diseases and their causes from the attending physicians, and no de
they are not unfrequently incorrectly stated. On this I would make a
gestion. The law does not oblige the attending physician to return the n
and sex of the deceased, the disease and its causes, except when *reque*
My suggestion is to have the law changed so as to make it obligatory on
part of the attending physician to return the name and sex of the decea
the name of the disease and its cause, to the town or city clerk; and on
part of the undertaker to obtain the name of the disease and its cause f
the attending physician, the certificates retaining their present form.

154. I think they [deaths] are all returned to the town clerk, but I
by examination to-day, of those for 1876 to date, that the disease is
stated by the attending physician in more than one-half of the certifica

156. I doubt if in every case of death the cause is certified by a med
man, for the reason that a certain number die every year without med
attendance, and under such circumstances that no physician could make
unconditional return without a post-mortem examination. In such ca
one can give a medical certificate to be used by parties known and supp
to be honest, with a declaration that it is based upon the representation
parents or friends. Such a document may be absolutely necessary to fa
tate interment.

157. I have reason to believe that the causes of death are very indi
ently reported. Physicians' certificates are not always required.

157½. The deficiencies in the first place are with the undertakers, or th
having the care of the funeral, or of the body of the deceased, to ascertain
facts in regard to the cause of death. In many cases the medical attend
is not even asked for the cause of death, or not even what ailed the pati
and when the return is made up there is some cause assigned in the cer
cate which does or does not represent the true cause of the death, and th
fore not reliable for accurate statistical information. For an exam
which occurred in my own practice: A gentleman died from cancer of
bladder and prostate gland, of several years' duration; it was returned
kidney disease, or complaint. The undertaker was informed by mysel
the true cause of the disease, while, as he says, the family said it was kid
disease, and he thought they ought to know best, and so he made his re
as kidney disease; and I find in my examination of the register very m
errors of a like kind. It is my impression, and in fact I know, that the ca
of death is not very generally reported by physicians in this town un
called for; perhaps more so now than formerly, for I have been urging
undertakers to be more particular in regard to the matter of ascertai
the true cause of death, and fulfilling all the requirements of the law
registration. Another fault is, the returns are not promptly made at

time of death and burial. The return is often delayed for one or two months, and even longer, and has even been delayed until after the annual return has been made to the secretary of the Commonwealth. This fact came under my own observation, for the returns were handed to me by the undertaker, saying that he forgot to hand them in before, and supposed that it would make no difference, as he was in the habit of making his returns but once a year.

161. The town sexton reports all deaths to the town clerk once a year, bringing the *blank forms* to the physicians for them to fill out, guessing, as near as can be done, when, from any cause, physicians are unable to certify advisedly. My belief is, that if the sextons were required to report *every month at least*, in country towns, the business would be performed more satisfactorily and with more exactness. Copies of the statutes relating to the matter should be posted up in some conspicuous place in town,—in the post-office, for instance,—so that all parties desiring to know what is law and usage, can thus be informed.

162. The returns are hardly ever filled and given to the registrar until the close of the year, which might, in some cases, make a little jar in the correct filling of blanks. The sexton usually brings his blank to me at the close of the year to be revised and filled as to points he is unable to do himself; in some cases, the death is so far back, that I am unable to be as correct as I would like. I do not say this to find fault with the sexton, for I think him to be a very careful man; it has been the custom for years, and he has only followed the custom.

163. The causes of death are sometimes certified to by a physician, if he is handy; if not, any one considers himself competent to assign the cause. In reply to the question, "Are three out of five certified to by physicians?" he (the town clerk) said, "No, not so many."

164. When undertakers are employed, they generally obtain certificates of causes of death from the physician in charge; but there are quite a number of burials by the family, where no undertaker is called upon, and in these cases no record is returned, unless the physician makes a point of returning the case himself, which few do.

170. I think the registration, as far as the name of the person is concerned, is complete and accurate, but of the causes of death, very inaccurate and deficient. The returns are made by the undertakers to the city clerk every week, and, as far as I know, they make returns of *all* the deaths, excepting in some cases of still-birth. But the causes assigned by the undertakers, in many cases, are very inaccurate and ridiculous, and in some instances with intentional deception. It is rare for the physicians to report the causes of the deaths.

171. Deaths are returned by the undertakers to the clerks, they inserting the cause of death, and simply guessing at it. No certificate has ever been presented to me for signature or filling by undertakers.

172. While perhaps all *cases* of death may be reported by the undertakers to the clerks, the causes are provokingly inaccurate, for the reason that

physicians are not required to return the causes of death, and the undertakers make returns of what they may be able to gather from the family.

179. For many years I have been so disgusted with the manner of conducting this business, that I have lost all interest in the matter.

180. Judging from returns of deaths coming under my own observation, I should say that undertakers are careful to make returns. In looking over the returns of *causes* of death in the clerk's office, I should give my opinion that tables made from them would be of little value.

182. I do not think all deaths are reported to the clerks—certainly not promptly. They are not returned by the physicians, but by the undertaker, who reports the cause of death as received from the friends. I have corrected the returns for the town clerk, as well as I could, for the past four or five years, but, of course, was not always sure of giving the accurate cause of death in every case, except where I have been the attendant.

185. In the main, I have long regarded the returns of deaths very imperfect. For instance, there were some 40 deaths returned by the clerk last year, and on my private list of deaths, which I keep from year to year, I had recorded 60.

190. The returns are made pretty promptly every week. As to the causes of death, the returns are as unreliable as is popular rumor in general, for that is all they amount to. The cause of death *very* rarely comes direct from any physician. I wish you would suggest the best way of remedying this matter; of making these comparatively worthless records what they might be—a valuable store of facts. For we shall probably have an available mayor next year.

191. I am glad you are going to present the subject of registration. It is one which has interested me for a long time. I have resolutely tried to have the system changed here, but to no purpose, as the city government has been changed every year; and I have not been able to get the mayor interested until the end of the year, when he has been turned out for a new man.

INFORMATION FROM TOWN AND CITY CLERKS.

Two hundred and sixty-two clerks replied to the circulars, as follows:—

Registration of number of deaths satisfactory,	102
" " " not satisfactory,	43
Replies indefinite,	117
Registration of causes of death satisfactory,	50
" " " not satisfactory,	113
Replies indefinite,	99

There were 144 cities and towns from which both medical correspondents and clerks answered. In these—

Town clerks and medical correspondents agree in . .	70
" " " do not agree in	74
" say satisfactory, and medical correspondents say not, in	15
Medical correspondents say satisfactory, and town and city clerks say not, in	8

Fifty-one of the seventy-four discrepancies in the replies are where one reports "indefinitely," and, therefore, are not strictly at variance.

Under the first head the clerks evidently often mean that their part of the work is satisfactory, and sometimes even say that the medical correspondents might think otherwise. Again, after saying that everything is satisfactory, they often add that they get returns only once a year by going for them personally, and one calls it satisfactory when he gets physicians' certificates only "in more than fifty per cent. of the cases"; others call the registration satisfactory, when they have not heard complaints. . Some say that they have not given the subject much attention. One "cannot spare the time to give the subject that consideration which it deserves."

One clerk states that, in his opinion, all deaths are reported, but adds that he has often wondered why it was that "consumption, cancer, and heart disease prevail here" so extensively. In this remark lies the key to the fact that prevalent diseases are reported in excess of what is due. So it is commonly, or at least often, that wasting diseases are classified as *consumption* ; infantile diseases as *cholera infantum*, etc. For the same reason, during epidemics of scarlet fever and cerebro-spinal meningitis, the mortality from those diseases appears very much exaggerated. This was notably true of diphtheria in our State in 1874 and 1875.

Many of the clerks remain in office only a short time, and do not really have their attention called to the subject farther than to follow precedents. Sometimes an efficient clerk gets his registration well in hand, and the next turn of the political wheel removes him and brings in another. It is, therefore, impossible to say that the error in our returns is nearly the same from year to year.

When the registration has been satisfactory, it has usually been due to a local board of health, or to the gratuitous labor of some interested clerk, who does the work which, by the law, belongs to some one else. One of them even says, for instance, that the clerk has about as much work in making out his return at the end of the year as if the undertakers and physicians had nothing to do with it.

By the personal efforts of the clerks, weekly returns are made of deaths and causes of death in the nineteen large towns and cities of the State; but even in some of the largest cities, there are still such imperfections in the registration that these returns are only approximate. The difficulty of fixing the responsibility for accurate registration on any one person is evidently working badly, and some of the replies to our circulars contain this statement.

It was not a part of the present plan to investigate the registration of births, and no questions bearing upon that matter were asked. Undoubtedly the liberal fee (when much travelling is not needed) stimulates the desire to get all cases. Still, some of the circulars were returned with the statement that the registration of births is even more unsatisfactory than that of deaths.

The defects pointed out in our records of vital statistics are manifestly such that they cannot be rectified in the painstaking and able elaboration of them for publication, nor explained by the high professional talent employed in editing them.

Replies of City and Town Clerks.

8. The custom has been to return the deaths at the end of the year, except when the body is carried out of town for burial; then I get a return near the date of death. I very seldom get the physician's certificate with the return; the cause of death is usually named, also the name of the physician; but all in the handwriting of the undertaker, and I think it is obtained from some member of the family of the deceased. I think the disease or cause of death is in many cases guessed at, so that my return to the department is not accurate as to the prevailing disease.

10. I find that about six-sevenths of the returns are made by the undertakers; the other one-seventh seem to have been made by friends of the deceased, rather than by physicians. The undertakers may have received their information from physicians for aught I know.

15. In answer to your inquiries, I would say that our undertaker makes full returns of all deaths where he officiates, but that is not in one-half of the cases. There are undertakers who come into this town and remove the

dead and make no returns; but when I go through the town for the births, and find a death, I get the best information I can.

17. The undertaker is furnished with blanks to fill, and he gets the best information he can from the family of the deceased, when making preparations for the funeral. These certificates are returned to the town clerk for registration at the close of each year. They usually contain some kind of a statement of the causes of death, sometimes attested by a physician and sometimes not. A section of our town always go to P—— for an undertaker, and the town clerk never gets any returns except such as he can gather when canvassing for the particulars concerning births. From this section, information as to the causes of deaths is very unsatisfactory.

19. I fear that in some towns not one-half the *causes* of death are obtained.

20. In small towns like this, where there is no undertaker, we do not get all the returns, and, if the clerk goes after them, it is very doubtful if he gets the cause of death correct.

24. A great many causes of death are returned as "heart disease," and nothing more. That disease assumes so many forms I have thought whether to medical men that was satisfactory.

27. I have never had reason to suspect any inaccuracy except in one instance, returned as "inflammation of stomach," where the death was probably caused by an attempt at abortion.

29. It has become unfashionable to comply with the requisitions of the statutes, and, if any officer points out this neglect of duty, he is answered that other town clerks are not so particular, and that no one lives up to the laws.

31. The law is in no case complied with, either as regards the undertaker, physician, or by the families themselves. At the close of the year, the births and deaths of the year past are collected by going from house to house throughout the town, making the result very unsatisfactory and expensive.

36. I think all the deaths substantially are reported to the undertakers, and most of these return the *deaths* promptly and accurately, but not the *causes of* death. In the case of private cemeteries, some of the undertakers make no attempt to obtain certificates. One undertaker in this city has always been in arrears, more than all other undertakers together. I showed him this circular, and he has since brought in all the certificates that were wanting, to date. In some cases no physician is employed, and we have no "city physician" to investigate the cause of death. Incompetent persons, quacks of both sexes, midwives, professional or non-professional, are employed in some cases, and their certificates are incorrect or worthless. Some of the regular physicians give a great deal of unnecessary trouble to the undertakers, who are often obliged to go many times before they can get a certificate. If the attention of physicians could be called to this matter, and if undertakers could know that they were liable to removal for not making full returns, most of the present difficulties would be removed.

38. There are not more than one-eighth of the causes of death certified to by physicians.

40. Returns are sometimes made with the cause of death omitted, or inserted by the person making the return, and too often stated in a vague or general way. Unless a permit for removal of a body is required, undertakers do not make their returns, as a rule, until the close of the year.

43. The certificates of physicians as to causes of death are rarely received at this office, and the record is dependent on the undertaker's certificate.

54. We have not any undertaker, but we usually employ those from the city of New Bedford, and they do not take the pains to make any returns in one-half the cases or more, and I seldom get the cause of death reported by a physician.

68. I should say that all the facts I report in about fifty per cent. of the deaths, I obtain as best I can.

74. During the present year, I have furnished the physicians and undertakers with all the proper blanks, together with pamphlet of instructions, but up to the present time not a single death has been returned to this office.

76. I think our registration of deaths is about as complete as you could have it. Whether we get the *causes* of deaths as accurate as possible, is a matter the physicians know best about. I don't think we do, in each and every case.

79. It has been my practice for quite a number of years past, when clerk, to visit or send some competent person to visit the families where births and deaths have occurred, and to ascertain the facts and particulars before making returns to Boston.

88. Physicians do not report any cases at all.

90. I have been clerk of the town for six years in succession, and have employed a man to gather all the information in regard to births and deaths called for in the blanks sent to me for that purpose. I have never received any information from physicians or undertakers.

93. If I were to make any suggestion, it would be that the people, especially in the small towns like ours, be in some way reminded by the state authorities of *their* duty in the matter of returning deaths, and other vital statistics, to the town clerk. As before stated, it now seems to remain with the clerk, in our town at least, to collect the facts concerning such deaths as may come to his knowledge, and it is only by keeping a close watch that he can be at all confident of accuracy.

94. The physicians' reports do not come so easily. The reason, I think, is, that the friends do not know that such a thing is required, so come unprepared, then of course forget to see the "Medicus," and the matter slips over. We have but one physician here. I see him occasionally, and fill up cases that he knows about, but many people employ doctors from the neighboring villages, and so I sometimes lose one.

95. I also am quite sure that the undertaker obtains his information in regard to the cause of death, in a majority of cases, from some member of the family, rather than from the physician. The reports of causes of deaths are incomplete.

97. Never until this year, has the returning of deaths been made in a proper manner; and I determined that I would have it properly done if the law was good for anything. I accordingly sent to or saw every physician and undertaker in the city and told them what I wanted to do, and that I must have their coöperation and assistance. I have had it, and must say that I am very well satisfied. It is only in the cases of those who are too poor to employ medical services, that the cause of death is not reported.

108. I have been in the custom of getting the cause of death indirectly from the undertakers through the superintendent of burials, who is a physician, and can give the technical name, which we would fail to get if we relied on the undertaker's return, especially in cases where there was no physician in attendance. The undertakers complain that they have difficulty in obtaining the cause of death from the physician in attendance, in time to make the return to the city clerk within the time required by law. The registration in this city has been very complete and satisfactory, especially for the last three or four years.

115. The causes of death, as returned by the undertakers, are not always correct, as they do not obtain the certificate of the attending physician. I therefore get the doctor's statement myself, and often find that it does not agree with the undertaker's return, which is made up from statements by the family of the deceased.

119. The causes of deaths are not generally made known, except in an incomplete and unsatisfactory way.

122. I have experienced some difficulty in obtaining the physicians' certificates as to the cause, etc.; that is to say, they delay the matter, and will not fill them out until solicited to do so by some one. I have always obtained or received them after a time. If they were required to fill them out *immediately*, the returns would be more accurate, and it would certainly assist matters.

123. I have physicians' reports of causes of death in 60 per cent. of the number of deaths.

126. There being no resident physician in active practice here, the people are obliged to employ physicians from other towns, rendering it impracticable, in many cases, to obtain the physician's certificate of the cause of death. Somewhat less than one-half of the deaths are so certified. All deaths are promptly returned by the undertaker, with a statement in each case of the cause of death, as correctly as it can be ascertained from the friends of the deceased.

127. In this town I think all the deaths are registered—the facts being returned to the clerk by the undertakers, each week, they are surer to be right than if returned monthly; this I know by experience; for, when

returned monthly, as required by the statutes, it would often happen that some would be delayed for two or three months, and I found more difficulty in having them corrected. No certificates of the cause of death are ever given in this town by the physicians; hence the cause of death, as returned to me, is very imperfect, in my opinion.

129. The cause of death is not returned in more than one-fourth the cases, and I have been obliged to ascertain it and, in many instances, to fill the returns myself. I think there should be some method by which the returns of deaths may be made more complete.

131. The only difficulty that I have experienced from the undertaker (for it is usually the same person from year to year) is, that he will insist upon keeping his returns until the end of the year, and making them in a body.

132. In answer to your circular of the 1st inst., I have to say that since my connection with this office I have found it almost impossible to get the complete returns of deaths from the undertaker. I have taken it upon myself to obtain them, and believe that, for the past nine months, the registration has been complete, except in a comparatively few cases, where physicians have neglected to make returns of "causes of death," when frequent applications have been made for them. How to remedy this neglect on the part of physicians and undertakers in small towns, is, in my opinion, a difficult matter to solve, unless, perhaps, the whole duty of obtaining all the facts relating to a death be assigned to one person.

135. In answer to your inquiries, I will state my impressions. I have kept the records since the year 1870, and have endeavored to have them correct. The rules and regulations of the board of health, in this city, are so well observed that every death is recorded, and the cause of death, as returned, is usually correct. If I have any doubt, I immediately send a blank to the physician, and leave the filling of the record until I have it returned.

136. To my knowledge, physicians' certificates of causes of deaths have never been called for or reported by them, with, perhaps, one or two exceptions, occurring some years ago.

139. I consider the registration very nearly complete in this town; the only deficiency being now and then a body removed from town for burial elsewhere, without application for a permit. I think there may be twelve such cases in a year; the number registered being from two to three hundred. The causes of death are given in all cases. In this town the returns are made to the clerk by the sexton who has charge of the burial, so that we are sure of returns of every interment. The sextons make these returns on the proper blanks, once in six months.

142. It is quite too common that the cause is not certified by a physician, especially in cases where no physician is in attendance; and I have heard the sexton say frequently that the doctors were rather indifferent as to the performance of the duty.

146. I think the present system of registration in case of deaths works well in this town of about nine hundred inhabitants. Our undertaker is

very careful to make *full* returns of *all* deaths; in nearly every instance the cause of death is reported and recorded. I presume more difficulty would be experienced in securing full returns in larger towns, especially among the foreign element.

147. Strangers sometimes die and are removed to a distance for burial. Such are liable to be overlooked, as they rarely call on the town clerk for a license to remove the body, probably through ignorance that the law requires it. It might be well to prohibit railroad employés from passing such over the road without having a license pasted on the top of the box.

158. In towns of over ten thousand inhabitants, it would seem that undertakers should make their returns at once, as soon as they are employed, and not be allowed a grace of seven days. The physician should make his certificate and leave it with the family or persons having care of the deceased at once after death, and not have fifteen days of grace. If the physician attends to his duty, then the undertaker has most of the information required; and it would be only a moment's work to fill up the necessary return complete, and the town clerk, with limited means for information, would not be obliged to supply all deficiencies, which is almost impossible in a town so large as this.

We have two large cemeteries here, and the smaller towns send during the year a great many bodies to be buried here. In such case, we have to be without any "permit to remove" or a physician's original certificate, and have to take the word of the undertaker, who fills the blank according to what he may have remembered being told or heard. In many cases, corrections have been made at my own expense, but I have not been and am not able to give my whole attention to this particular branch of my duties. In most of these out-of-town cases, the undertaker waits ten days, and oftener two or three weeks, before making any return; the record is then, at best, very meagre, and there is no way to make a full return. Everybody has shirked the matter or been careless, and all the town clerk has to do is to supply deficiencies and give the undertaker a permit, because the cemetery corporation has allowed the burial without a permit and the undertaker has really done the best he could (?). If the railroad and express companies would not receive a body unless there is the proper certificate of removal accompanying it, and if the cemeteries would not allow a body to be buried without a "permit to bury," I think the difficulty would be overcome. This might not be easy to carry out in small towns at first, but in large towns of ten thousand inhabitants and over, there would be no trouble after a few weeks, if the physician and undertaker would make their certificates as suggested.

We rarely use the "physician's certificate," but, instead, use the one on the return blank. I have tried my best to have the first used, but have given it up. There are so many "holes" in the statute that all we can do is "the best we can." I do not know that I can suggest anything in regard to registration, but can give you information regarding the work in this town and hope that we are not behind our neighbors.

The average of time between decease and registration is about ten days. Permits to bury are granted in all our cases, but always after interment. In removal from town, our undertakers always get a "permit." We rarely use a physician's certificate-blank. In most cases, we are able to get a physician's certificate to the return; in case there is no doctor in attendance, we do without. We rarely receive permits to remove, with bodies coming from other towns in the State, excepting, always, the large cities.

159. In a town of this size, there is not much danger that *any death* will escape registration. People seldom die here except from *old age.*

165. Causes are not reported by the physicians as they should be, but, in more than half the deaths, causes are obtained from physicians before any record is made.

168. As we are situated near the state line of Rhode Island, undertakers come from Providence, take charge of funerals and do not make any returns to me. For the last two years, since I have been town clerk, I remember of but one instance, in about twenty such cases, where they have made the returns that our law requires.

169. The deaths are not all returned by the undertakers, but the fault seems to be with physicians, who are very negligent in the performance of that duty. At least twenty-five per cent. of the deaths, in this town, are reported from other sources.

172. Probably the causes of about one-quarter of the deaths are certified to by a physician. The town is so small that the physician's certificate is not necessary, as the cause is known generally.

179. The registration of deaths in this town is all correct, so far as we can obtain returns, but the returns are not as prompt and certain as they should be. There were two or three deaths in town last year that were not reported, I have since learned, and they are not all returned in the manner the law directs.

180. In reply to your circular received a short time since, I will say that neither the undertakers nor physicians make any report whatever in regard to deaths or the causes thereof. I have, at my own expense, sent a man over the town each year since I have been town clerk, with instructions to get *all* the facts and every name of persons who have died during said year. As to the accuracy of what he is able to gather respecting the "causes of death," you can judge better than I. The friends report what they have understood the physician to say was the disease or cause of death.

182. The registration of the number of deaths is probably complete: causes, perhaps, not fully satisfactory, blanks for "returns of deaths" being seldom filled by the attendant physician, but by the acting undertaker or some individual chosen by the family of the deceased to take charge of the funeral ceremonies.

186. The cause of death gives me most trouble. When families are not able to state it, I make a point of ascertaining it from the attending physician, and do not always get it then.

195. Of the 64 deaths registered here in 1875, 46 were certified by physicians, and the proportion is probably not very different from that in past years.

198. Of all returns made, from fifty to sixty per cent. are certified by physicians.

216. The great deficiency is in regard to the causes of death; very few physicians' certificates are furnished, and the information of the undertakers, obtained from the families, is often partial and inaccurate.

219. Nearly all the returns of the fact of death are promptly reported. There are some cases omitted where a sexton from out of town is employed, and in them I endeavor to supply the deficiency, as far as possible, when looking up the births.

225. I think the registration is quite complete, and that the deaths are very fully registered. The causes of deaths are not nearly so satisfactory, the undertaker getting the information from the family, and, I think, quite rarely from the physician. I remedy this as much as possible by taking them to the physician myself at the end of the year and getting him to revise them. I send you a few samples of causes of death, by which you will see the necessity for revision. If sextons were obliged, in all cases where there is an attending physician, to get the information from them, it would improve the character of the returns.

230. The undertaker has generally left a blank at the time of the interment, which, in some cases, has been retained to nearly the close of the year, and I have been obliged to hunt them up myself. Of thirteen returned to me the present year, six were without the cause of death certified by any physician.

237. About half of the deaths are returned. The remainder are obtained by the clerk as he collects the births. Only in a few cases are the causes of death accurately and specifically given, the clerk being obliged to supplement that part of the work. Very few, if any, of the regular blanks are used, although there have always been plenty in the office here for that purpose.

242. But very few of the causes of death are returned by physicians. None of our leading physicians have made any returns for some years, and never did so except in a very few cases. Some eight years since, I furnished all the physicians in this city with blank certificates for them to make returns of the cause of death, and only received a limited number of them.

243. The causes of deaths are not returned generally as they should be.

244. The returns by undertakers are made promptly, and I think I get them all except in case of foreigners who remove for burial. Sometimes they are not returned. The causes of deaths returned are not perhaps always satisfactory.

245. In many cases, the causes of death are reported according to the received belief of the family and neighborhood. I get such returns as "died by the visitation of God," or "by the hand of God," quite often; and "heart disease" and "old age" constantly. When I know little or nothing about the case, I make the record according to the undertaker's return. In other cases, although I am no physician, scientific or otherwise, I exercise some little discrimination of my own.

246. I would say that for six years that I have been clerk of this town, but one death has been returned to me by the parties required by law to do so.

247. Probably three-fourths of the death-reports are accompanied by a statement of causes. I usually call upon the physicians a second time; *i. e.*, after the undertaker. In this way, I get most of them complete, but not any too accurate, I fear.

250. I cannot recall a single instance, during the nine years I have been clerk of this town, of having received a physician's certificate of cause of death; and the causes, as reported by undertakers' returns, are in many instances inaccurate and incomplete.

254. Three or four years ago, when cerebro-spinal meningitis was prevalent, I had from this class (irregular practitioners) one or two deaths returned from that disease, when I thought I knew absolutely that the cause of death was entirely different. In such case, has not the town clerk the power to alter and correct the returns? *I do.*

HISTORY OF REGISTRATION OF DEATHS.

In considering how to avert the recurrence of the terrible plagues which visited London in the sixteenth century, the first step was to find where and under what circumstances people died, and how variously different localities were affected. For this purpose registration was organized, imperfect, it is true, but sufficient to give many important hints. Much later, when the Poor-Law Board was created, a better system of registration was adopted; but it was only in 1837 that it was carried out with all the force of an Act of Parliament, and with the coöperation of the physicians, surgeons and apothecaries promised by the presidents of their associations. The law has been improved from time to time by many amendments; and finally physicians were compelled to return certificates of death under penalty, in 1874, as was then already the law in Scotland.

To such a high degree of perfection has registration of deaths now arrived in England, that on each Tuesday a printed pamphlet of ten pages is prepared and sent over the kingdom, giving the causes of deaths, etc., with the conclusions and warnings to be drawn from them, *for the week ending the previous Saturday*, and collected from twenty-three towns, containing over eight million inhabitants. This return also contains the latest information from the large cities of the world,—from New York and Philadelphia to Calcutta and Bombay,—and fully justifies Dr. Farr's enthusiastic remark, that "Thus observers, like watchmen on the walls, are ever on the lookout, so that they see exactly what is going on, and neither plague, cholera, nor any other great epidemic can take the nations by surprise." * Quarterly, yearly and decennial reports are also published.

The Imperial Board of Health of Germany have taken steps to collect and publish similar returns *promptly* from all cities in the empire containing 15,000 inhabitants and over, especially with reference to getting early information in regard to epidemics.

Our registration in Massachusetts followed four years after that of England, and is so similar as to justify the inference that it was taken almost directly from it.

The law of Massachusetts regarding registration (chapter 21 of the General Statutes) is as follows, the amendments being inserted in the places where they belong :—

SECTION 1. The clerk of each city and town shall receive or obtain, and record and index, the following facts concerning the births, marriages, and deaths therein, separately, numbering and recording the same in the order in which he receives them, designating in separate columns :

In the record of births, the date of the birth, the place of birth, the name of the child (if it have any), the sex and color of the child, the names and the places of birth of the parents, the occupation of the father, the residence of the parents, and the date of the record ;

In the record of marriages, the date of the marriage, the place of marriage, the name, residence, and official station of the person by whom married, the names and the places of birth of the parties, the residence of each, the age and color of each, the condition of each (whether single or widowed), the occupation, the names of the parents, and the date of the record ;

In the record of deaths, the date of the death, the name of the deceased, the sex, the color, the condition (whether single, widowed, or married), the age, the residence, the occupation, the place of death, the place of birth, the names and places of birth of the parents, the disease or cause of death, the place of burial, and the date of the record.

SECTION 2. Parents shall give notice to the clerk of their city or town of the births and deaths of their children ; every householder shall give like notice of every birth and death happening in his house ; the eldest person next of kin shall give such notice of the death of his kindred ; the keeper of a workhouse, house of correction, prison, hospital, or almshouse, except the state almshouses at Tewksbury, Bridgewater, and Monson, and the master or other commanding officer of any ship shall give like notice of every birth and death happening among the persons under his charge. Whoever neglects to give such notice for the space of six months after a birth or death, shall forfeit a sum not exceeding five dollars.

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* 37th Report, p. vi.

SECTION 3. Any physician having attended a person during his last illness, shall—when requested within fifteen days after the decease of such person—forthwith furnish for registration a certificate of the duration of the last sickness, the disease of which the person died, and the date of his decease, as nearly as he can state the same. If any physician refuses or neglects to make such certificate, he shall forfeit and pay the sum of ten dollars to the use of the town in which he resides.

SECTION 4. Every sexton, undertaker, or other person having charge of a burial-ground, or the superintendent of burials having charge of the obsequies or funeral rites preliminary to the interment of a human body, shall forthwith obtain and return to the clerk of the city or town in which the deceased resided or the death occurred, the facts required by this chapter to be recorded by said officer, concerning the deceased, and the person making such return shall receive from his city or town the fee of ten [as amended, *twenty-five*] cents therefor.

The clerk, upon recording such facts, shall forthwith give to the person making such return, a certificate that such return has been made, which certificate such person shall deliver to the person having charge of the interment, if other than himself, before the burial when practicable, otherwise within seven days thereafter. When a burial takes place and no certificate is delivered as aforesaid, the sexton, undertaker, or other person having charge of the interment, shall forthwith give notice thereof to the clerk, under penalty of twenty dollars.

SECTION 5. The clerk of each city and town shall annually on or before the first day of February [as amended, *March*] transmit to the secretary of the Commonwealth, certified copies of the records of the births, marriages, and deaths which have occurred therein during the year ending on the last day of the preceding December.

SECTION 6. The record of the town clerk relative to any birth, marriage, or death shall be *prima facie* evidence, in legal proceedings, of the facts recorded. The certificate signed by the town clerk for the time being shall be admissible as evidence of any such record.

SECTION 7. The clerk shall receive from his city or town for obtaining, recording, indexing, and returning to the secretary of the Commonwealth, the facts in relation to a birth, twenty [as amended, *fifty*] cents; a marriage, ten [as amended, *fifteen*] cents; a death, twenty cents for each of the first twenty entries, and ten cents for each subsequent entry [as amended, *if returned as provided in sections* 2, 3 *and* 4*; if obtained by the clerk himself, the fee is thirty-five cents*], as the same shall be certified by the secretary of the Commonwealth; but a city or town containing more than ten thousand inhabitants may limit the aggregate compensation allowed to their clerk. He shall forfeit a sum not less than twenty nor more than one hundred dollars for each refusal or neglect to perform any duty required of him by this chapter.

SECTION 8. The superintendents of the state almshouses at Tewksbury, Bridgewater and Monson shall obtain, record and make return of the facts in relation to the births and deaths which occur in their respective institutions, in like manner as is required of town clerks. The clerks of said towns shall, in relation to the births and deaths of persons in said almshouses, be exempt from the duties otherwise required of them by this chapter.

SECTION 9. The secretary shall, at the expense of the Commonwealth, prepare and furnish to the clerks of the several cities and towns, and to the superintendents of the state almshouses, blank books of suitable quality and size to be used as books of record under this chapter, blank books for indexes thereto, and blank forms for returns, on paper of uniform size; and shall accompany the same with such instructions and explanations as may be necessary and useful. City and town clerks shall make such distribution of blank forms of returns furnished by the secretary as he shall direct.

SECTION 10. The secretary shall cause the returns received by him for each year to be bound together in one or more volumes, with indexes thereto. He shall prepare from the returns such tabular results as will render them of practical utility, make report thereof annually to the legislature, and do all other acts necessary to carry into effect the provisions of this chapter.

SECTION 11. Any city or town containing more than ten thousand inhabitants may choose a person other than the clerk to be registrar, who shall be sworn, and to whom all the provisions of this chapter concerning clerks shall apply. The returns and notices required to be made and given to clerks shall be made and given to such registrar, under like penalties.

SECTION 12. The secretary of this Commonwealth shall prosecute, by an action of tort, in the name of the Commonwealth, for the recovery of any penalty or forfeiture imposed by this chapter.

SECTION 13. Any city or town may make rules and regulations to enforce the provisions of this chapter, or to secure a more perfect registration of births, marriages and deaths therein.

FAULTS IN OUR LAW.

From failure to enforce this law in some cases, and in others from its inadequacy, there are many defects in our vital statistics which may be remedied. Of course, there will be some errors always. There are some cases in which it is impossible to state accurately the cause of death without an autopsy, and it cannot always be done then. The best men will make some mistakes, and charlatans will make a great many.

It is important, therefore, that in all cases of sudden death at least, and better still, in all cases, the physician's certificate should state whether there was an autopsy, as is done now in Watertown at Dr. Hosmer's suggestion. Competent physicians, too, should be registered, as in England; and reports signed by others, or where for any reason no physician was able to get sufficient information as to cause of death, should be classified as uncertified.

Errors arise, too, from want of uniformity in the practice of physicians as to certifying causes of death. For instance, of three persons dying from typhoid fever, suppose the *immediate* cause of death in one to be exhaustion, in another intestinal hemorrhage, and in a third pneumonia. Here are four "causes of death" as now happens; namely, "typhoid fever," "exhaustion" (consumption the undertakers call it), "hemorrhage" and "pneumonia." They should all be certified as typhoid fever, and the other facts should be stated. Instructions relative to this and other kindred matters should be given from the central office.

The infant who was reported as having died of "canker rash, diphtheria, dysentery and consumption," and another, whose cause of death was returned as "five doctors," doubtless had good reason to die; and "delicate from birth," infancy," "stopage," "fitts," "colera fantum," "collocinphanton," "cholry fanton," "bled," "direars" (? diarrhœa), "billirm (? delirium) feever," "artry lung bursted," "feusson (? effusion) on brane," "canker on brain" and "information lungs" probably convey some ideas to the persons who wrote the terms; but such returns cannot be of much use in a statistical point of view.

For sudden deaths, and where no physician has been in attendance before death, the selectmen should be required to call upon some medical man for the best certificate possible under the circumstances. Inquests will often be needed, but the question of coroners* is too broad and important to be touched upon here, further than to say that many now in office are grossly incompetent, and that abuses are too common.

In Europe many persons die without medical care; and especially in some of the more populous places, *leichenbeschauer* and *médecins vérificateurs* (examiners) are employed by the city or by the state to learn the circumstances of death; but this is chiefly to ascertain that the death was not by foul means.

Where the town clerk rides about his circuit at the end of the year to collect the births and deaths, some must inevitably be lost by removal of families, forgetfulness, etc. Where the undertaker makes his reports only at long intervals, of course some will be overlooked.

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* One of our correspondents writes: "I submitted the suggestion concerning the appointment of coroners, or investing physicians who may be members of local board of health with the powers exercised by those officers, to one of our most prominent lawyers, who cordially approved them, and wished me to write more at large upon the subject. I will not do so, however, further than to say that in this town of 6,000 inhabitants there is no coroner, and there has been none for the last forty years; nor is there, to my knowledge, at this time, one within twenty miles. So the impediments in the way of the judicial action that circumstances sometimes demand in the name of justice are very great."

Generally, physicians readily give certificates when asked for them, so that this evil of delay may be avoided. If, however, the family or friends of the deceased were responsible for getting the doctor's certificate and the registrar's permit, the doctors would undoubtedly take much more pains to have their part of the duty promptly done. The people would soon get accustomed to so reasonable a law, as they have already done in England, and as they have done here (in some towns) when the body is to be removed to a distance for burial, or in the case of marriage certificates. In such case there would be no reason why the undertakers should have their present fees.

To make the law fully operative, there should be a penalty for burying in any private or public cemetery without a permit, to be enforced equally upon keepers of cemeteries and individuals. Exceptionally it might be necessary, in case of contagious diseases, in scattered communities, etc., to allow the permission of the selectmen or health officer to suffice, leaving the certificate to be returned later.

Railways and public conveyances now carry bodies without permits, and such bodies are conveyed pretty much over the State, either for interment or reinterment. Of course, this should never be; in case of a contagious disease, it might involve serious danger to the public health.

For the increased duties which town clerks would have under better enforcement of the registration laws, and with more efficient regulations, the present fee for registration of deaths is, in some cases, rather small, but it need not be as large as the clerk's and the undertaker's together now amount to.

The section of the law by which "any city or town may make rules and regulations to enforce the provisions of this chapter or to secure a more perfect registration of births, marriages and deaths therein," is apparently not often acted upon; but it has been done in a few cases. The boards of health of Boston and of Brookline have done very efficient service in this regard; and one of our correspondents writes:

"The registration of deaths in Woburn is complete and satisfactory. Physicians are required to make returns of the cause of death in *every case*, before the town clerk will issue a permit to the sexton for burial."

IMPORTANCE OF REGISTRATION.

It is not too much to say that modern sanitary science owes its existence to the registration of deaths and the localization thereby of insanitary conditions. It has been very much advanced, too, by the careful enumeration of cases of sickness as well as of deaths, whereby epidemics and locally prevalent diseases have furnished the means of scientific study, from which general laws have been learned, and through which state medicine has become a necessity of modern life.

REGISTRATION OF DISEASES.

As soon as it was recognized as a part of the duty of the State to prevent disease, something more was needed; namely, a knowledge on the part of the health officers of the approach of epidemics. Of course, this want implied the existence of health officers, whose duty it should be to take measures to stop an epidemic, and who should have the power to carry out proper measures for so doing.

This need has indeed been recognized for many years, and in many countries; but usually the laws have referred solely to the more dangerous diseases, like small-pox, cholera, yellow fever and plague, or it has become the custom to interpret them in that way.

The late Dr. George Derby suggested at one time the value of returns from the dispensary physicians and hospitals of the diseases treated,* to be reported to the State Board of Health weekly; a method which has yielded excellent results in the army medical departments in different countries. This has indeed been done to a certain extent in England, where the medical officers of the Poor-Law Board are required to report to the health officers the cases treated by them; but it is only a partial and unsatisfactory method, because hospitals, almshouses, etc., etc., are so well protected that contagious diseases often get thoroughly established in a community before appearing there, and for other reasons, so that numerous petitions have been sent to the English government for a more stringent law requiring registration of all cases of contagious diseases. The position of the physicians is well represented by the following extract from the report of Dr. John Whitmore, health officer of St. Marylebone for 1875 (p. 20): "It is very certain that until the sanitary officials of the metropolis are able to obtain prompt information of every case of sickness from contagous or infectious diseases occurring in their respective parishes or districts, and are able, immediately on the receipt of such information, to adopt all necessary precautions, and impose all necessary restrictions, to prevent its spread or diffusion among the healthy, there will be no material diminution in the death-rate from diseases of this class."

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* Third Report of the State Board of Health, p. 13.

The same is well expressed by another authority: "The choice must be between an abandonment of any attempt to register sickness, and a scheme which, by the aid of compulsory legislation, shall provide a registration of sickness which shall be of real use to the state and the community at large." *

A striking illustration of the fact that registration of diseases often secures results of importance which cannot be got from mortality returns or from physicians' impressions, has been shown in Paris during the past year, where the mortality from typhoid fever was excessive, but its prevalence not unusually great. The additional interesting facts that the disease was most prevalent in the fall, when the ground-water was low, and most fatal in the spring, correspond with the results of Dr. Pinkham in his investigations with regard to diphtheria in Lynn, and given at a later page in this Report.

In 1874 the British Medical Association appointed a committee to consider the best method of accomplishing this object, and they reported, in 1876, that the families and friends of the sick should be required by law to give information of all cases. In some few places in England physicians have volunteered to report to the health officers at once their cases of contagious diseases. In Newcastle-upon-Tyne "daily

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* Sanitary Record, March 4, 1876.

notice continues to be received, from the dispensary and other sources, of infectious diseases of all kinds, when, as hitherto, examination into its probable cause is at once proceeded with, and such recommendations and steps taken as are most suited to the nature of the case and best conduce to the extinction of the disease, including the gratuitous disinfection and purification of the premises of cases and the replacing of infected articles of bedding by others." *

Holland.

In what has actually been done by the state, the Netherlands are far in advance of the rest of the world. By the law of December 4, 1872, the following regulations (among others) were made relative to contagious and infectious diseases (small-pox and varioloid, scarlet fever, measles, typhus fever, typhoid fever, cholera and diphtheria, to which dysentery was added December 3, 1874) :†—

Burgomasters may remove patients from tenement houses and taverns to a hospital, if they deem it necessary, and by advice of a physician.

They may temporarily close such public houses, etc., at the public expense, when the medical inspectors deem it necessary.‡

They may cleanse and disinfect houses, cottages, and vessels, upon the order of one of the inspectors or of a practising physician.

They may, with medical authority, disinfect or destroy articles infected or suspected to be so.

They may remove filth, cleanse streets, etc., etc., in preparation for a threatened epidemic.

They may regulate, in various ways, the transportation of such sick persons, the attendance at school of children, and the discharge from the hospitals of those sent there.

Neither teachers nor scholars are allowed to enter schools, who have not been vaccinated or have not had small-pox.

In each district the authorities must furnish opportunity for free vaccination at least once in every three months.

They must provide proper places for the treatment of contagious diseases, when required by general order to do so.

They must provide dead-houses within a year after the passage of the law.

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* Report of the medical officer of health on the sanitary condition of Newcastle-upon-Tyne during the year 1875, by Henry E. Armstrong, M. R. C. S., 1876.

† If deemed necessary, other diseases may be added to this list by the authorities for the time being; but permanent additions must be made by royal statute.

‡ By the law of June, 1865, there are seven inspectors in the kingdom, of whom each has a separate district. Five of these inspectors, having large districts, have assistants.

In case of death from contagious or infectious disease, they may send the corpse at once to the dead-house.

Heads of houses, masters of vessels, etc., must report all cases of the above-mentioned diseases to the burgomaster, under penalty, within twenty-four hours.

Doctors must report all cases of cholera and small-pox to the burgomaster, under penalty, within twenty-four hours.

The houses in which there are contagious diseases must be conspicuously marked by the officials with the words "*Contagious Diseases*," and with the name of the disease.

Public announcement of epidemics in any district must be made, and weekly reports of cases and deaths from all of the above diseases, except measles, must be published by the burgomaster; from measles, only the deaths.

In case of cholera, there must be daily reports.

Public fairs and festivals may be stopped on account of the presence of an epidemic.

Medical inspectors have power to enter houses where there are contagious diseases.

The penalties for violating the various provisions of this law are fines from five to one hundred florins, and imprisonment from three days to a month.

According to Dr. Egeling, the medical inspector of South Holland, excellent results have been got by this law, and he gives a list of the persons who were fined in 1874 for violation of it.* In many places it has been well enforced; but in the report of the department of works at Rotterdam,† the ratio of deaths reported to the cases reported indicates that the law was not in all cases carried out.

Germany.

In Germany, an advisory board of health for the empire was appointed last summer, with Dr. Struck as chief medical officer. Their first work was to undertake to revise the sanitary statutes, especially with relation to vital statistics; and a commission had already reported favorably to the parliament on a law regarding registration of contagious and infectious diseases, as had been suggested by the German Public Health Association in 1875. In Prussia, already, every town of over 5,000 inhabitants must have a *sanitäts-commission*, who have large powers in the police of infectious diseases.

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* Verslag aan den Koning, etc., 1875 (pp. 248 *et seq.*).

† Verslag van den Toestand der Gemeente Rotterdam, 1875 (pp. 105 *et seq.* and Appendix F.).

United States.

In the United States, the board of health of Brooklyn began, May 1873, to require physicians to report all cases of contagious diseases, as the sanitary code provided, including especially cholera, yellow fever, small-pox, scarlet fever, cerebro-spinal meningitis, typhus fever, typhoid fever, diphtheria, and "any other disease publicly declared by the board of health dangerous to public health." In their last report they say (page 11), "the report of transmissible diseases by physicians has been insisted on and enforced by the board," and (page 12) "whenever it is found that there has been a failure to report, the matter is investigated, and, if not properly explained, is referred to the attorney of the board for prosecution."

The number of cases reported from May, 1873, to January, 1875, was 2,007; during 1874, 4,637; and Dr. Hutchison, the health commissioner, says that under this ordinance the mortality for 1874 was 3.56 per cent. less than for previous years. "The decrease in the mortality was principally of the diseases termed 'infectious,' and with the causes of which it is the duty of sanitary authorities to contend."

Many of the regulations of the board show great care; for instance, "funerals after deaths from small-pox must be conducted without delay, and these also are superintended by an officer of the board."

The total number of actions commenced by the attorney of the board, on all cases, from September, 1873, to January, 1875, was 1,288.

All physicians possessing diplomas from medical schools are registered by the board, and all deaths not certified by them are investigated by the proper officers.

In Pittsburgh, similar work was done in 1875, and the health officer, Dr. Crosby Gray, reports that "the law is not as effective as it should be, as it fails to mention specifically some of the diseases which are regarded as infectious, and a few of our physicians are inclined to take advantage of the defect. However, a majority do comply, and all, I believe, report small-pox."

In Oakland, California, "Dr. C. S. Kittredge was elected registrar, to collect statistics to enable the health department to ascertain, as nearly as possible, the exact number of cases of sickness for each death occurring during any given period, properly classified. The value of such statistics, when accurately collected, and sufficiently large, is well recognized. Unfortunately, after some 1,200 cases had been collected, the returns, even after repeated appeals for continuance were made, ceased almost entirely to be made, so that there was no possibility of the continuance of this 'labor of love.'" *

During the year 1875, Dr. F. W. Draper ably carried out, under the authority of the Massachusetts State Board of Health, a plan of reporting prevalent diseases suggested by him. As nearly as can now be said, about one hundred and ten physicians, a little more than one-half the number who agreed to coöperate, sent in their reports each week from about ninety of the three hundred and forty-one cities and towns in the State. Unfortunately, too, for comparison, the physicians not reporting were not the same from week to week.

According to the last census there are 2,345 male physicians and 91 female physicians in the State, with a population of 1,651,912; and the Board therefore received one weekly report to represent 15,000 people, and from less than one physician in twenty. It was hoped that some method might be reached whereby a sufficient number of returns might be got each week to allow the generalizations from them to be based upon more complete and fuller knowledge; but, even allowing one return from an average of 3,000 people, the expense would be very much greater than the present appropriation of the Board would justify. There was the fact, too, that the information got would be general opinions and not positive facts, and, although they would have some local value, any trustworthy generalizations from them would be attended with such difficulty and must be so limited as to make their value somewhat questionable.

The state board of health of Michigan have modified and are testing this experiment still further; but for the present, the Massachusetts Board are publishing, each week, in the "Boston Daily Journal," the death-rates, etc., from cities and

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* Report of the Board of Health of Oakland, 1876, p. 5.

towns representing about one-half the population of the State, of which a copy is given :—

"MORTALITY IN MASSACHUSETTS.

"Deaths reported in Seventeen Cities and Towns for the Week ending November 4, 1876.

CITIES.	Estimated Population.	No. of Deaths in each.	Annual Death-rate per 1,000, during week.	Death-rate from principal Zymotic Diseases.
Boston,	352,000	131	19.64	3.84
Worcester,	51,300	22	22.30	10.14
Lowell,	51,700	33	33.19	16.09
Chelsea,	21,300	9	21.97	4.88
Cambridge,	50,000	7	7.28	1.04
Salem,	26,500	13	25.51	9.81
Lawrence,	36,000	10	14.44	4.33
Springfield,	31,400	9	14.90	8.27
Lynn,	34,000	14	21.41	6.11
Gloucester,	17,000	7	21.41	15.29
Fitchburg,	12,600	4	16.51	12.38
Taunton,	20,700	4	10.05	2.51
Newburyport,	13,400	6	23.28	7.43
Fall River,	47,200	15	16.53	4.41
Haverhill,	15,000	3	10.04	–
Holyoke,	17,300	6	18.03	6.01
Pittsfield,	12,500	5	20.80	4.16
Total,	809,900	298	19.13	5.78

"Deaths from prevalent diseases in the seventeen cities and towns :—

Diphtheria and croup, thirteen cities and towns,	56
Consumption, twelve cities and towns,	55
Pneumonia, seven cities and towns,	17
Typhoid fever, seven cities and towns,	11
Scarlet fever, three cities and towns,	6

"The mortality from consumption and pneumonia remains very nearly as for the week previous. Diphtheria and croup and scarlet fever have slightly increased. Typhoid fever and the diarrhœal diseases have decreased. No deaths are reported from small-pox; but there is one case in Holyoke (non-fatal).

"CHAS. F. FOLSOM, M. D.
"*Secretary of the State Board of Health.*"

This is not, by any means, as satisfactory as the Board would desire; for it fails to include all the deaths in all the cities reporting, allows many local and non-fatal epidemics to escape being reported, and undoubtedly in some of the cities gives a certain number of erroneous causes of death; but it is the least incomplete practical method at present, improves from year to year, and, at least, cannot seriously mislead.

That there should be something more than this is evidently desirable; and it is to be hoped that the means of informing the community promptly, with regard to the appearance of contagious diseases, may be one of the near possibilities.

THE GROWTH OF CHILDREN.

By H. P. BOWDITCH, M. D.,
Professor of Physiology, Harvard Medical School.

THE GROWTH OF CHILDREN.*

On the 24th of September, 1872, at a meeting of the Boston Society of Medical Sciences, a communication was made of which the following report was published in the "Boston Medical and Surgical Journal" for December 19, 1872:—

"Dr. Bowditch exhibited a diagram showing the rate of growth, in height, in the two sexes. The curves of growth were so drawn that the abscissas gave the age in years, and the ordinates the height in feet and inches. They represented the average measurements on thirteen individuals of the female and twelve of the male sex. The measurements were all taken annually during the last twenty-five years, and the individuals were all nearly related to each other. An examination of the curves shows the following facts:—

"1. Growth is most rapid during the earliest years of life.

"2. During the first twelve years boys are from one to two inches taller than girls of the same age.

"3. At about twelve and a half years of age girls begin to grow faster than boys, and, during the fourteenth year, are about one inch taller than boys of the same age.

"4. At fourteen and a half years of age boys again become the taller, girls having, at this period, very nearly completed their growth, while boys continue to grow rapidly till nineteen years of age.

"The tables and curves of growth, given by Quetelet, show that, in Belgium, girls are, at no period of their lives, taller than boys of the same age, though at twelve years of age their weight is precisely the same as that of boys, and decidedly less both before and after that period. Measurements taken among the lower classes, in Manchester and Stockport, show that, during the thirteenth and fourteenth years, girls are superior to boys of the same age, both in height and weight.

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* The investigation, of which the results are given in this Report, was originally undertaken under the auspices of the health department of the Social Science Association, but in view of the extended character which the inquiry gradually assumed in its progress, and of the direct bearing of the question on the sanitary condition of the people, it was decided to make it the subject of a report to the State Board of Health.

"It would be interesting to determine, by more extended observations, in what races and under what climatic conditions the growth of girls, at about the period of puberty, is the most rapid. It is possible that in this way, facts may be discovered bearing upon the alleged inferiority in physique of American women."

To explain the discrepancy thus apparent in the results of observations in different countries, a renewed investigation seemed to be necessary, and, as a contribution to our knowledge of the subject, a systematic measurement of the pupils, in the public schools of Boston, was undertaken.*

The nature and object of the inquiry are explained in the following letter read by Dr. D. F. Lincoln at the meeting of the Social Science Association at Detroit, in 1875, with the hope of exciting an interest in the subject, which might lead to similar investigations in other parts of the country.

"The object of ascertaining the heights and weights of the pupils in the public schools of Boston is to determine the rate of growth of the human race under the conditions which Boston presents. It is, of course, very desirable that similar observations should be made in other parts of the country, in order to enlarge the number of data from which conclusions may be drawn. This country offers an excellent field for investigations of this sort, not only on account of the wide range of climatic conditions which it presents, but from the fact that the inhabitants are the immediate descendants of a large number of different races. If we can compare, therefore, the rate of growth of a race in their native land, with the rate of growth of the same race after emigration to this country, we shall be able to study the effect of transplantation into new climatic conditions; and if we compare together the amount of change which the rate of growth of different races undergoes after emigration to this country, we shall have data for estimating the relative adaptability of the races in question to the new climate. Moreover, if it shall be found that the rate of growth of the female sex is more seriously modified by emigration than that of the male sex, light may be thrown on the question of the cause of the alleged inferiority of the physique of American women. As the value of observations of this sort depends entirely upon their accuracy, it is important that the height should be measured without shoes, on rods graduated to one-tenth of an inch. The weight should be determined on scales weighing pounds and ounces.

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* The necessary authority for the work was granted by the school committee in the following order:—

IN SCHOOL COMMITTEE, March 9, 1875.

Ordered, That permission be given to Prof. Henry P. Bowditch, of Harvard University, to ascertain the height and weight of the pupils attending the public schools, through such an arrangement as the respective chairmen and the head masters, or masters, may deem most convenient.

Attest: BERNARD CAPEN, *Secretary*.

METHOD OF INVESTIGATION.

In order to obtain the necessary data, blanks, with the following headings, were prepared and distributed to the various schools :—

Record of the Height and Weight of the Pupils in the
School for , *Boston,* *187* .

Number.	NAME.	AGE.		HEIGHT WITHOUT SHOES.		WEIGHT IN ORDINARY CLOTHES.		Birthplace.	NATIONALITY OF PARENTS.		Occupation of Parents.	Remarks.
		Years.	Months.	Inches.	Tenths.	Pounds.	Ounces.		Father.	Mother.		

The principals of the schools were personally visited, the nature of the inquiry explained to them, and their coöperation in the work requested. It is to the friendly and intelligent interest shown by these gentlemen that the success of the work is in great measure to be attributed. The above-mentioned blanks were filled out by the various teachers for their respective classes, the weighing and measuring being done under the personal superintendence of the principals themselves, or, in a few instances, under that of a trustworthy deputy. The heights, without shoes, were measured by means of a rod graduated to tenths of an inch and furnished with a sliding horizontal bar and a clamp by which it could be fixed firmly to any table in a vertical position. The heights were usually recorded at the nearest tenth of an inch, but in some instances at the nearest quarter inch. In the case of one set of papers, where they were given at the nearest inch, the observations were rejected in calculating the averages.

The weights were determined by Fairbanks' platform scales weighing to ounces; but, in view of the error necessarily introduced by the unknown weight of the clothing, they were recorded only at the nearest quarter pound. The allowance to be made for clothing in calculating the average nėt weight will be considered later.*

The birthplace of the pupils was recorded with the view of discriminating between native- and foreign-born children, but the latter were found to be so few in number, that it was thought best to disregard entirely the data of this column.

The nationality (*i. e.*, the native country) of the parents was ascertained by questioning the pupils. In a few instances, where, owing to the youth or ignorance of the pupils, the result of this inquiry was unsatisfactory, the necessary information was obtained through the police. It is not to be supposed that the data recorded under this heading are absolutely accurate. There are doubtless instances where foreign-born parents are recorded as American; but this probably occurs chiefly in those instances where the parents have emigrated to this country in very early life, and have thus become completely acclimated before the birth of their children. For a thorough study of the effect of climate in modifying the rate of growth of different races, it would, of course, be important to ascertain the nationality of the ancestors of the pupils for several generations; but this inquiry seemed quite impracticable for the generality of public-school pupils, and was therefore not attempted. Data of this sort were, however, obtained, through the kindness of Lieut. Zalinsky, from a number of the pupils in the Massachusetts Institute of Technology.

The occupation of parents was copied from the school records, with a view of ascertaining approximately the effect of the social condition of the parents on the growth of the children; but the utilization of the data thus obtained has been necessarily postponed for the present, on account of the great addition to the labor of this investigation which it would involve.

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* Notwithstanding the many advantages of the metric system of weights and measures, it was not employed in this investigation, because it was considered that, the measurements being taken by many different individuals, greater accuracy would be secured by the use of familiar units. Moreover, the general results being expressed in comparatively few figures, can be readily calculated in the metric system, and thus made comparable with those of observations taken in Continental Europe.

Under the head of remarks, the teachers were requested to note any deformity of the pupils which might render it expedient to exclude their measurements from the calculation of a normal average. The fact of color was also noted under this heading, in order that negro and mulatto children might be distinguished from white children of American parents.

The statistical data above described were collected in nearly all the public schools of the city proper, in several schools in South Boston, Roxbury, Charlestown and Jamaica Plain, in the Massachusetts Institute of Technology, in Mr. J. P. Hopkinson's private Latin School, in Miss Hubbard's school for young ladies, and, through the kindness of Dr. Robert Amory, in several of the public schools of Brookline. About 24,500 observations were thus collected, a number which was considered sufficiently large to justify conclusions on the subjects to which the inquiry was directed.

On the receipt of the records from the various schools, the observations were at once tabulated according to the nationality of the parents, those of each nationality being arranged on a separate series of sheets, showing at a glance, in parallel columns, all the observations of any given age. The greater part of this work of tabulation was performed by Miss Mary P. Nichols, to whose accurate and patient labor the value of the results obtained is largely due. Mr. James Dike also rendered valuable assistance in this work.

In this tabulation, it was important to select only those nationalities which would give at each age a sufficient number of observations to justify the calculation of an average. The selection was of course at the outset to a great extent conjectural and tentative, and could be definitely made only as the work progressed. It was finally decided to limit the tabulation by nationality of parents to the following groups :—

I. Parents, both American.
II. Parents, both Irish.
III. Parents, one American and one Irish.
IV. Parents, both German.
V. Parents, one or both English.

In the last three of these groups the observations were not sufficiently numerous to establish the rate of growth with very great precision; but the results have a certain value as approximations to the truth.

The observations thus tabulated were placed in the hands of professional accountants, by whom the average heights and weights for the different ages and nationalities were calculated both in the English and in the French systems of weights and measures. The results are given in Tables Nos. 1 and 2, at the end of this article.

It will be noticed that it has been assumed in this investigation that the rate of growth of children may be ascertained by computing at any one time the average height and weight of children of different ages, as well as by determining the average height and weight of a given set of children in successive years. This assumption is doubtless perfectly justifiable, though certain theoretical objections may be urged against it. It may be said, for instance, to involve the further assumption of the prevalence at any given time of equally favorable conditions for the growth of children of *all* ages. It is, however, conceivable, that at a certain time, particularly favorable or unfavorable conditions for the growth of young children may prevail, while the growth of older children may be less affected. The rate of growth determined by observations taken at this time will therefore show a deviation from the normal type. This objection is deprived of whatever weight it may have by extending the observations over a considerable length of time. It is probable that when the investigation is carried on, as in the present instance, during the greater part of a year, the effect of such disturbing influences may be regarded as, to a great extent, eliminated, though a series of investigations undertaken at intervals of several years would be necessary to definitely settle the question. For a further discussion of this method of ascertaining the rate of growth, the reader is referred to the statistical investigations of Dr. B. A. Gould,* p. 115.

From the averages given in Tables Nos. 1 and 2, Table No. 3 was then computed, showing the annual increase both in height and weight of children of both sexes, and of the above-mentioned parentage. In this table is also given in the columns headed "pounds per inch," a series of figures obtained by dividing the weight in pounds by the height in inches, and showing what, for want of a better word, may be called the "stoutness" of the children at different ages, etc.[*]

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* Investigations in the Military and Anthropological Statistics of American Soldiers. By Benjamin Apthorp Gould. New York. 1869.

In order to obtain a more adequate idea of the growth of the children in this community than that furnished by the average heights and weights, another set of tables was computed, showing for every age the number of observations at each height and weight. Tables of this sort for children of American and of Irish parents, and for the whole number of observations irrespective of nationality, are given at the end of the article. (See Tables Nos. 4 to 15.) The observations on children of other nationalities were so few in number that it was not considered important to present them in this form. To facilitate a comparison of the distribution of the observations at different ages, a second column of figures is given under each age, showing the *percentage* of the observations occurring at any given height or weight.

A tabulation of this sort renders it possible to see at a glance the extreme range of variation of the individual observations. In the progress of the work, many cases were met with of heights and weights differing so widely from the average measurements of the age to which they belonged, as to excite a suspicion of error in the observation. In these cases application was made to the principals of the schools for a confirmation or a correction of the measurements. About forty errors were thus detected, the necessary corrections made, and the tables of averages made more accurate than they otherwise would have been.

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[*] It will be noticed that in Tables Nos. 1 and 2 the ages are given "at the last birthday." Hence, the *average age* of the children thus grouped together will be six months greater than the age given in the tables. For instance, 5 years 6 months is the average age of the 201 boys of American parentage, whose height is 41.74 inches, and whose weight is 41.20 pounds. Now, since the figures in the columns headed annual increase, in Table No. 3, are the differences between the successive heights and weights in Tables Nos. 1 and 2, it is evident that they express the yearly growth precisely at the age given in the table. For instance, if the average height of the above-mentioned boys of 5½ years old is 41.74 inches, and that of the boys of the same parentage, one year older, is 44.10 inches, then 2.36 inches is the average annual increase in height of boys at 6 years of age. On the other hand, the figures in the columns of Table No. 3, headed pounds per inch, express (as in Tables Nos. 1 and 2) the ratio of the weight to the height of the children whose age *at last birthday* is placed opposite to them in the table.

RESULTS.

The results of the whole investigation are embodied in the tables at the end of the article; but, in order to facilitate their comprehension, the graphic method has been adopted for their expression, curves having been constructed which indicate at a glance the more important conclusions which can be drawn from an examination of the tables. Thus, on Plate I., the ordinates of the two upper curves express the average heights for each age of all the children measured, irrespective of the nationality of their parents, the full line representing the boys' rate of growth and the broken line that of the girls. The two lower curves indicate the average weights in the same set of observations. The age is expressed by the row of figures on the line of abscissas, the height in inches by the column on the left (corresponding to the two upper curves) and the weight in pounds by the column on the right of the plate (corresponding to the two lower curves). The figures at the bottom of the plate show for each age the number of observations from which the averages were computed.

Plates II. and III. exhibit in a similar way the rate of growth in height and weight of children of American and of Irish parentage.

The curves on these plates are less regular than those of Plate I., owing to their being constructed from a smaller number of observations; but they have the same general character. The observations on children of other than American or Irish parentage were so few in number, that it was not considered important to construct curves to express the results. An examination of the figures in Tables Nos. 1 and 2 shows that the curves of growth present everywhere the same general features.

The curves on the other plates are constructed in a similar way, and will be described in connection with the subjects which they illustrate.

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Plate I. *Showing rate of growth of Bo*
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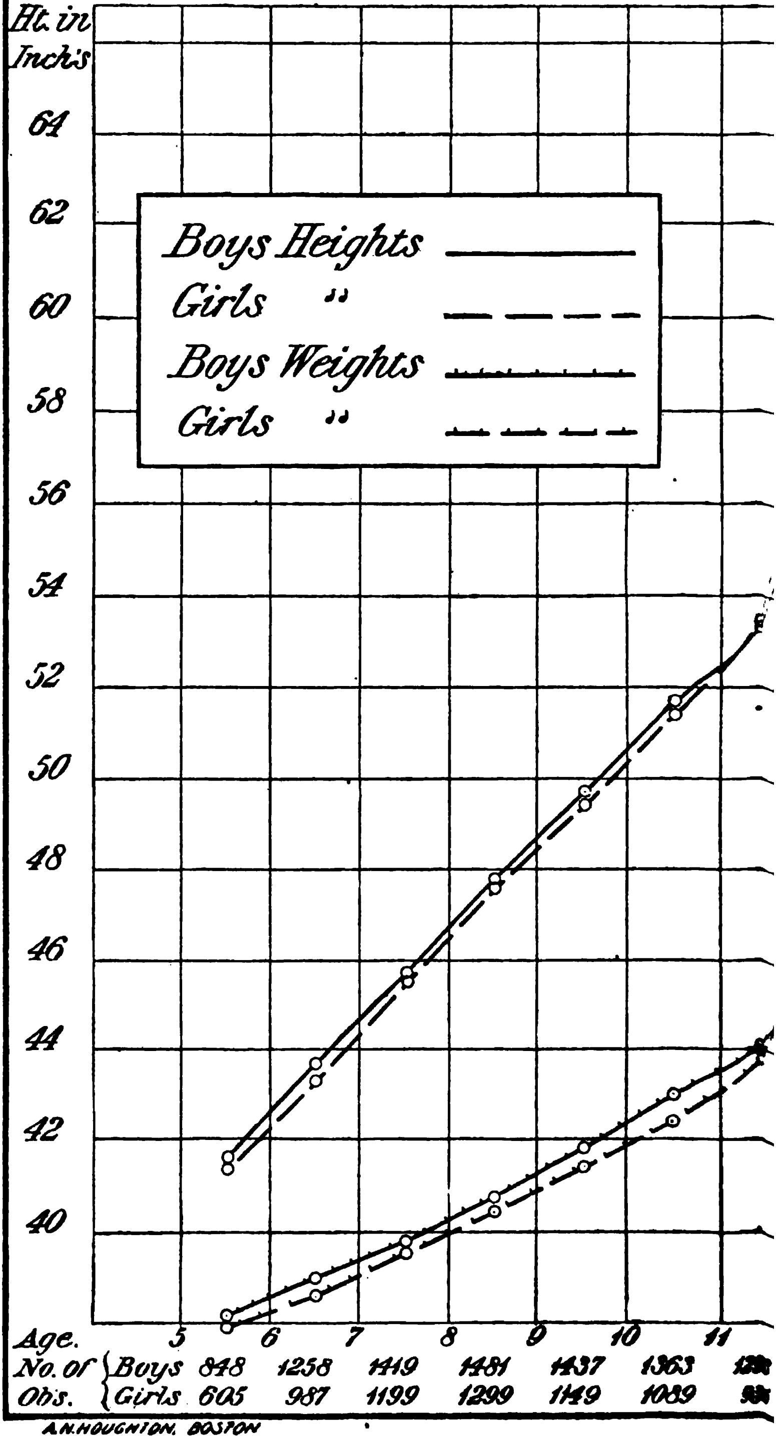

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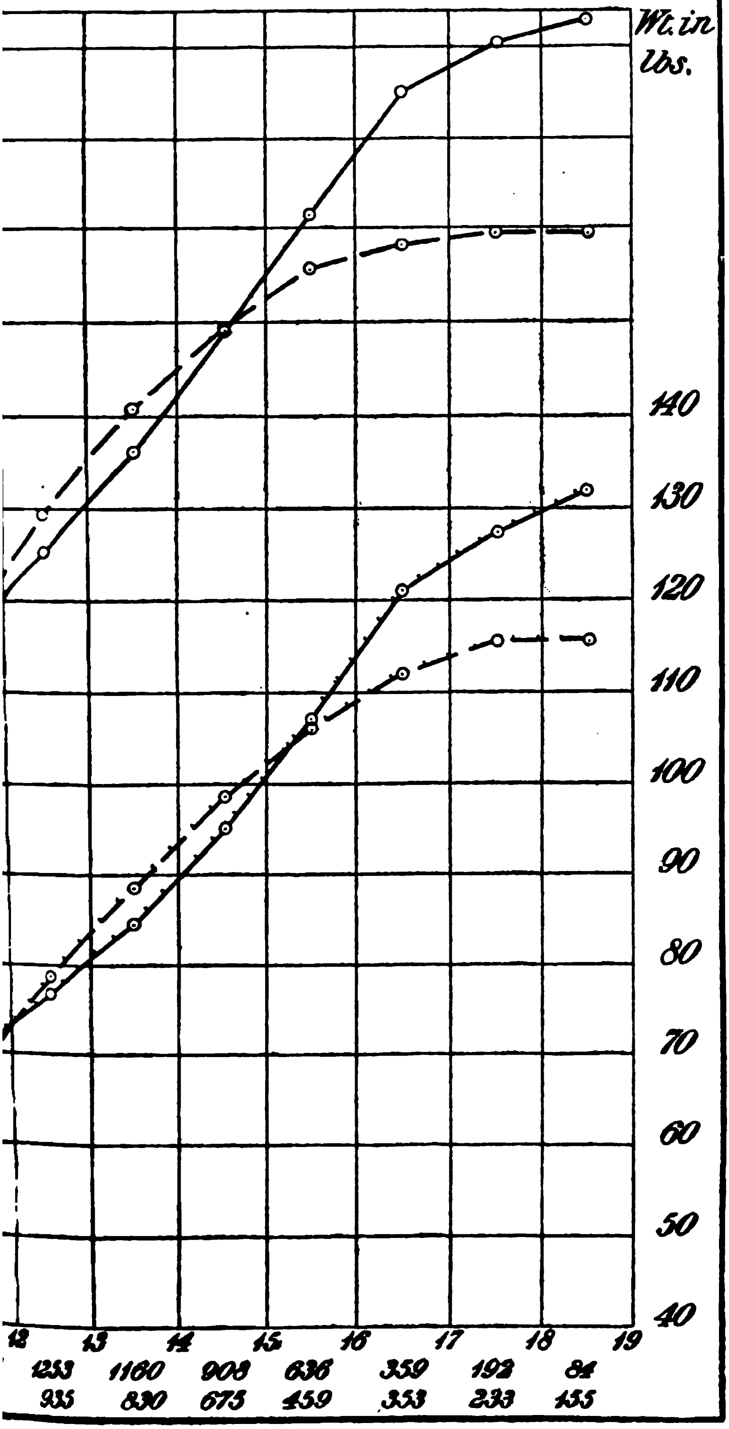

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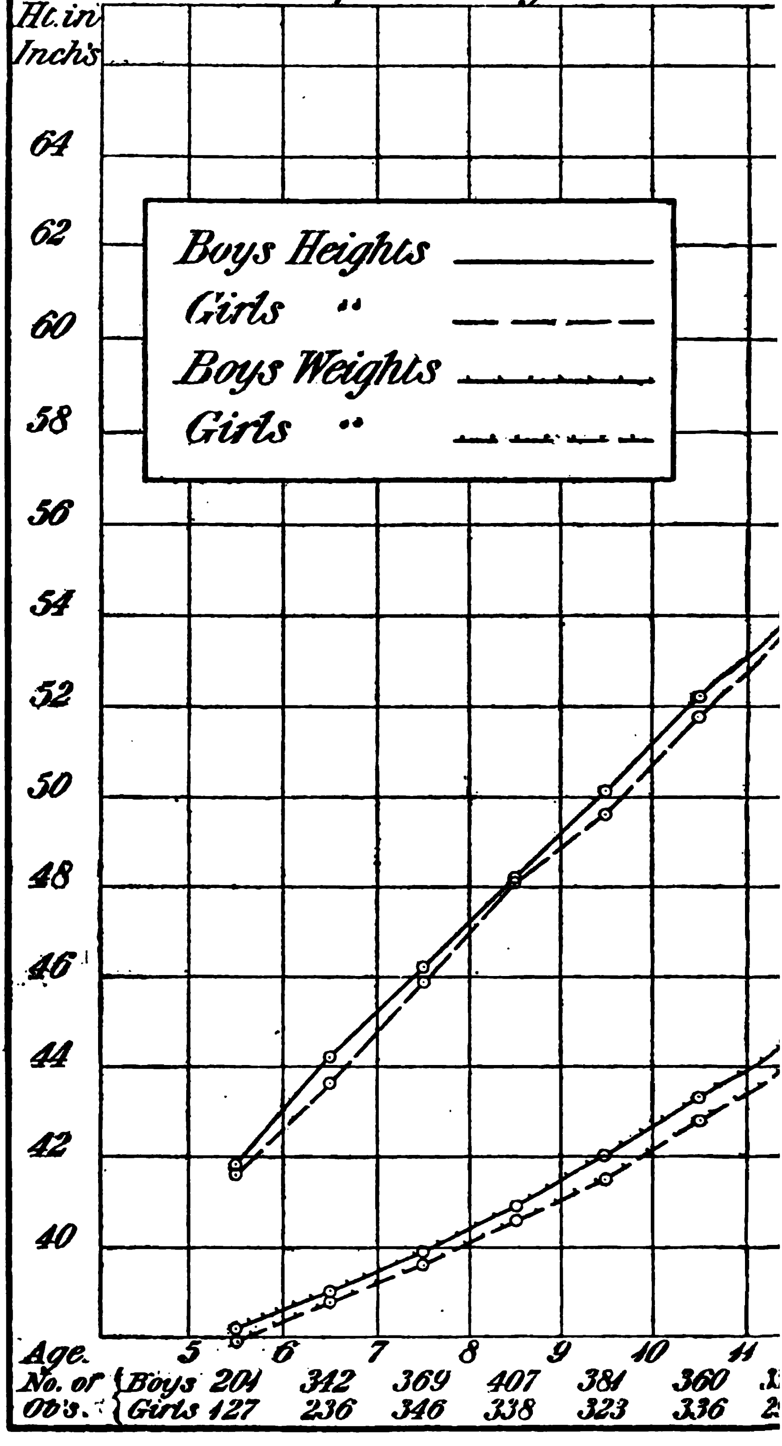
Plate II. *Showing rate of growth*
American parentage.



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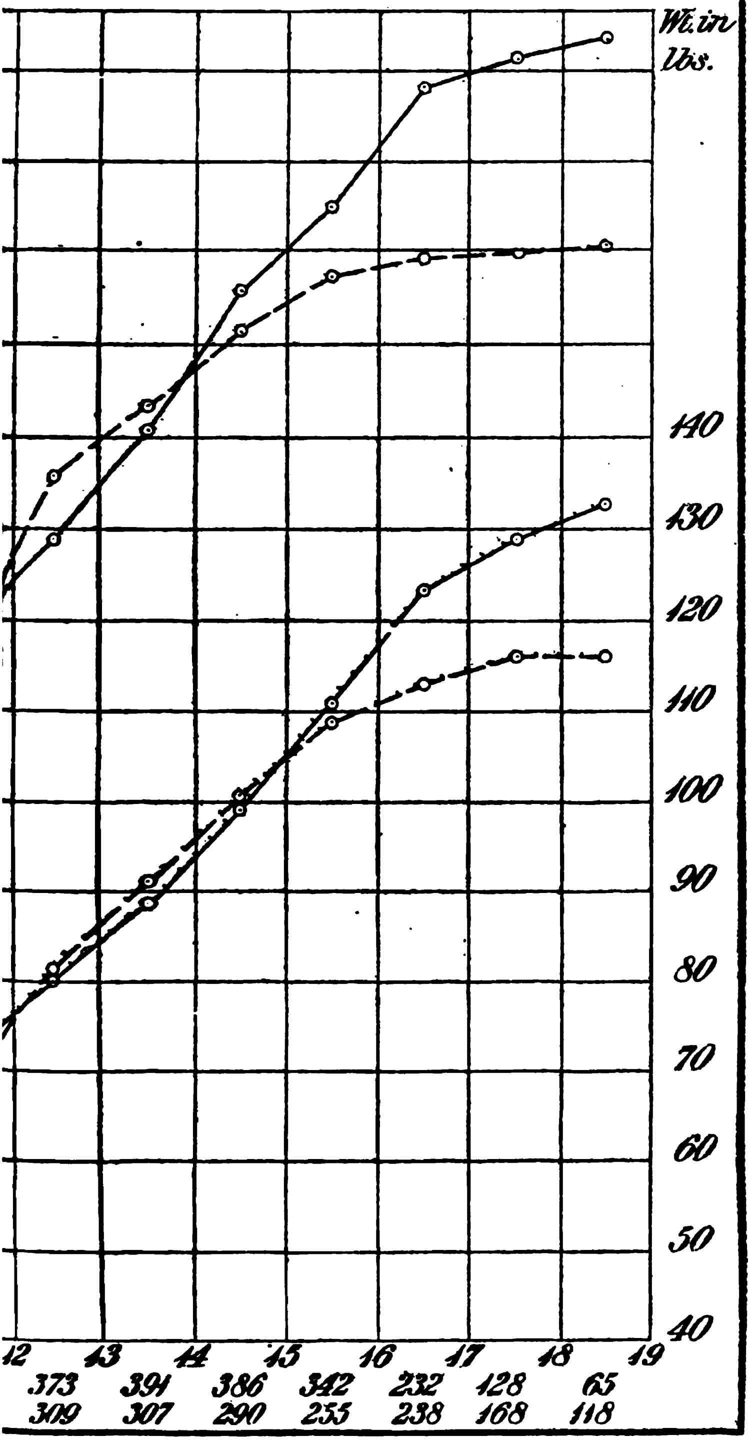

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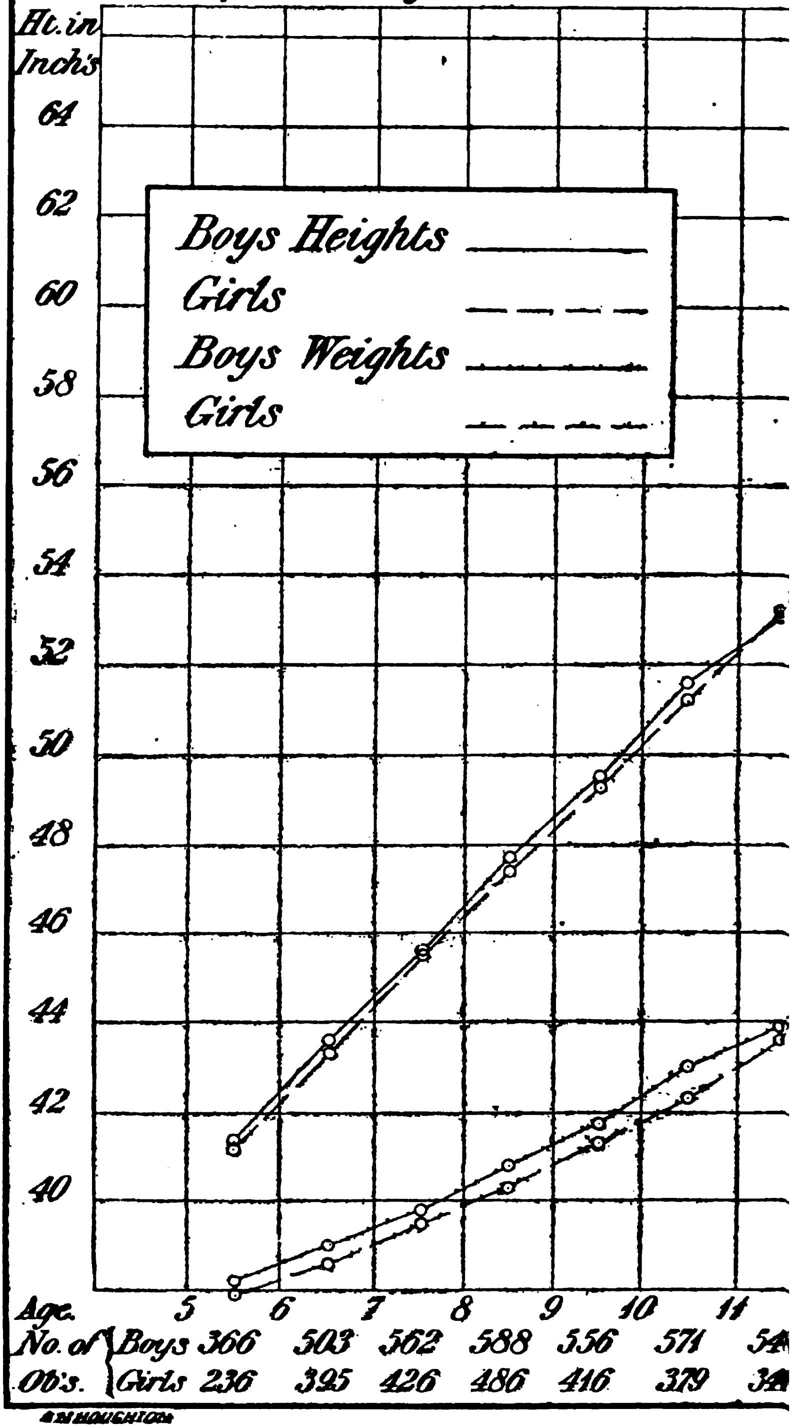
Plate III. *Showing rate of growth*
Irish parentage.



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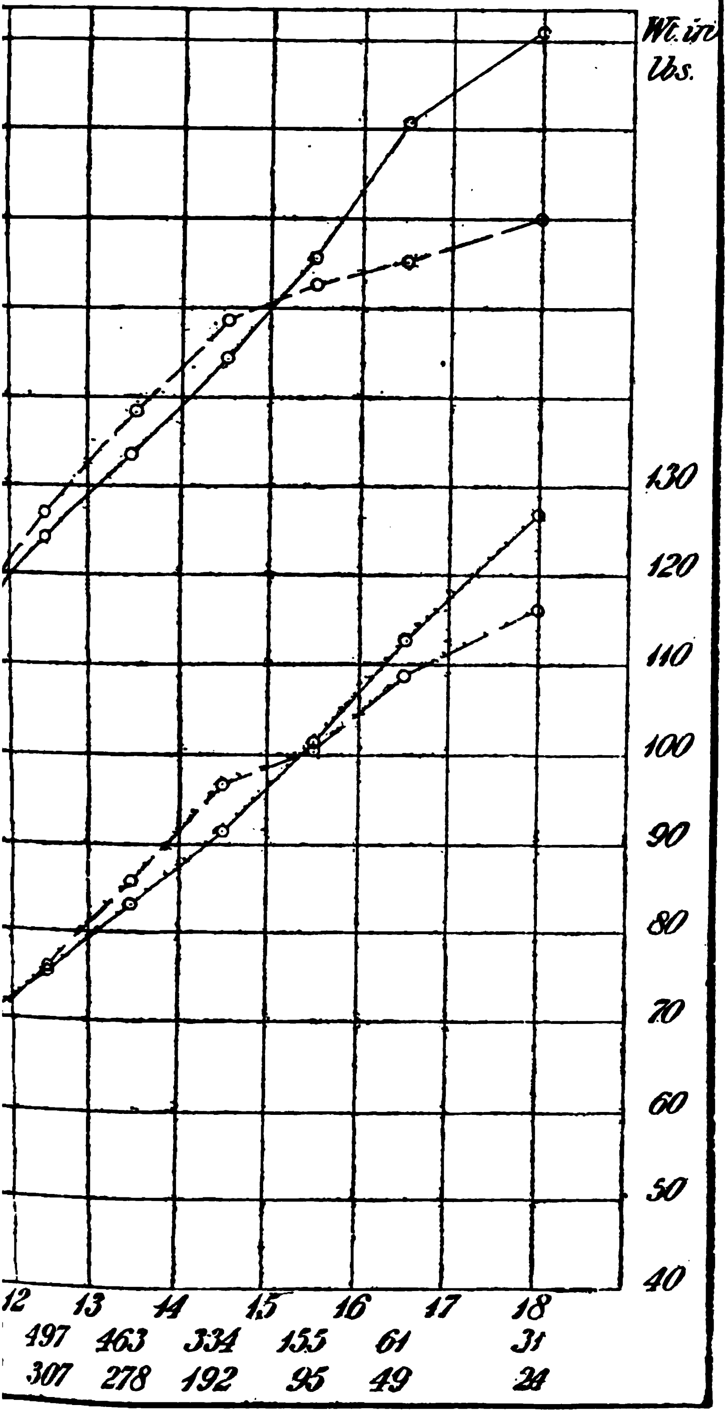

Comparative Rate of Growth of the Two Sexes.

An inspection of Tables Nos. 1 and 2, or of Plates I., II., and III., shows in the most conclusive manner that at about 13 or 14 years of age girls in this community are, during more than two years, both taller and heavier than boys at the same age, though before and after that period the reverse is the case. Table No. 3, giving the annual rates of growth, shows the same thing in a different way. Here we see, in the column of totals, that the greatest annual increase in height occurs for girls at 12 and for boys at 16 years of age, while the maximum increase in weight is for boys at the same age and for girls one year later than the maximum increase in height. Similar, though not identical facts, are obtained by examination of the columns in which the observations are distributed according to the nationality of the parents.

This difference in the age at which the rate of growth attains its maximum in the two sexes, suggests a connection of the phenomenon with the period of puberty which presents a similar difference in the time of its occurrence. On the principle, clearly enunciated by Carpenter[*] and by Herbert Spencer,[†] that growth and reproduction are to some extent antagonistic processes, it may perhaps be reasonably supposed that at the age at which the organism becomes potentially reproductive will not be a period of excessive growth, and an examination of the data at our disposal seems to show that this is the case. It is of course almost impossible to determine statistically the average age at which males become capable of reproduction; but for the female sex the first appearance of the catamenia furnishes a satisfactory indication that this period has been reached. Few data have been collected for determining the age at which American women begin to menstruate, but Dr. J. R. Chadwick has kindly permitted the use of his manuscript tables containing the records of observations on patients at the Boston Dispensary and the Boston City Hospital. From these records observations on 575 American-born women have been selected and arranged in the following table in such a way as to indicate whether the date of the first menstruation was given approximately or accurately.

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[*] "There is a certain degree of antagonism between the nutritive and reproductive functions, the one being executed at the expense of the other. The reproductive apparatus derives the materials of its operations through the nutritive system, and is entirely dependent upon it for the continuance of its function. If, therefore, it be in a state of excessive activity, it will necessarily draw off from the individual fabric some portion of the aliment destined for its maintenance. It may be universally observed that, when the nutritive functions are particularly active in supporting the *individual*, the reproductive system is in a corresponding degree undeveloped, and *vice versa*."—*Principles of Physiology, General and Comparative.* Third edition, 1851, p. 592.

[†] The Principles of Biology. Vol. II., chap. 6.

TABLE No. 16.

Showing the Age at which Menstruation begins in American Women.

AGE AT LAST BIRTHDAY.	NUMBER OF OBSERVATIONS.		
	Approximate.	Accurate.	Total.
10,	4	–	4
11,	18	8	26
12,	44	5	49
13,	87	20	107
14,	126	16	142
15,	96	16	112
16,	72	11	83
17,	18	6	14
18,	16	4	20
19,	4	1	5
20,	3	–	3
Whole number,	488	87	575
Average age,	14 yrs. 5 mos.,	14 yrs. 7½ mos.,	14 yrs. 5½ mos.

A comparison of these data with the figures in Table No. 3 shows that the period of rapid growth which gives to girls their temporary superiority over boys precedes the average age of puberty by at least two years, and that at the age of puberty the annual growth in height is less than at any previous period of life. Whether a similar relation prevails in other countries and in the male sex, are questions to be settled by future investigations.

An examination of the curves on Plates I.–III. shows that the statements in regard to the rate of growth of the two sexes, made in 1872,* as the result of a very small number of observations, are fully confirmed by a more extended investigation, and that the facts announced at that time in

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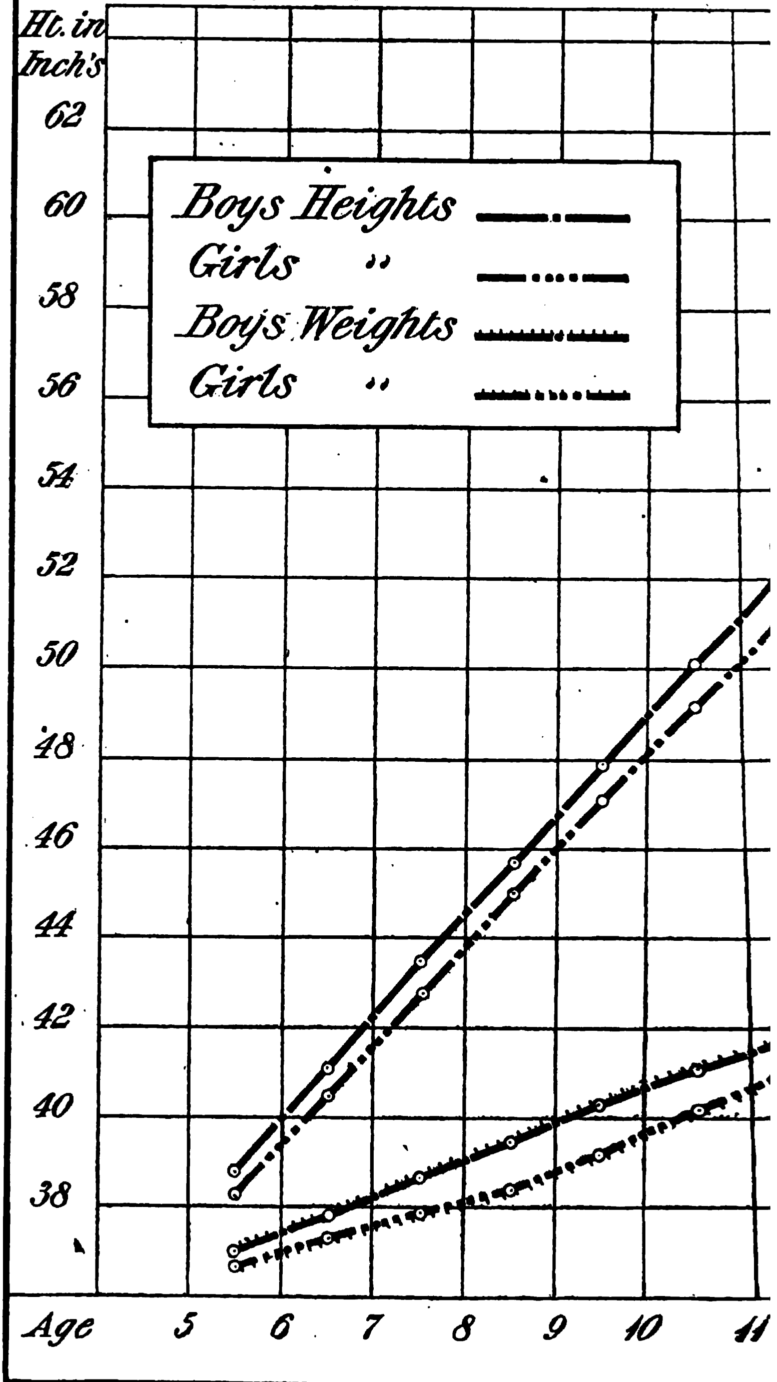
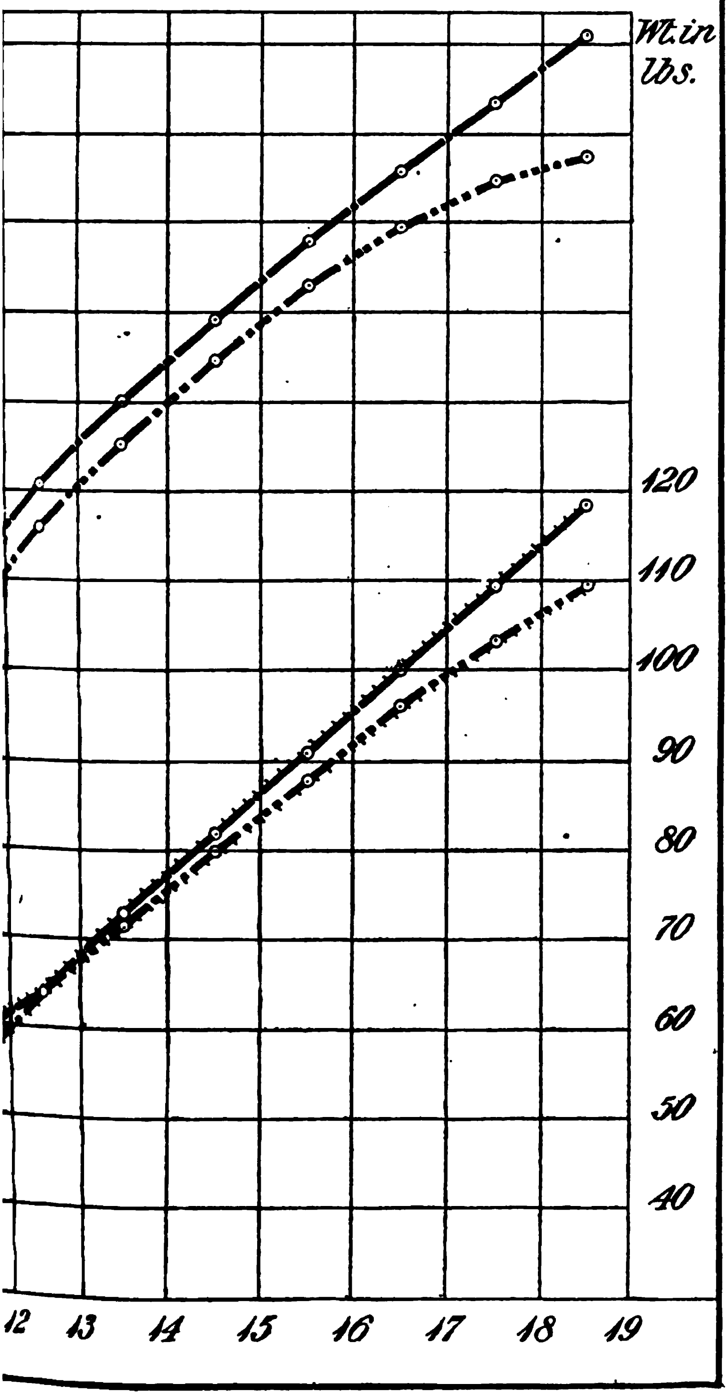
* See beginning of this article.

Plate IV. *Showing rate of gro*
cording to Quetelet's observ



th of Belgian children ac-
tions.



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regard to the growth in height are found to be equally true of the growth in weight. It was hoped at the beginning of this investigation that it would be possible, by comparing these observations with those taken in foreign countries, to determine how far the peculiarities in the rate of growth, thus made manifest, depend upon differences of race or climate. This seemed the more desirable from the fact, that, according to Quetelet, the curves of growth of the two sexes never intersect, as they are shown to do in these observations. For purposes of comparison, an extract from Quetelet's tables is here given, showing the height and weight of the children of both sexes in Belgium at the ages included in our observations. On Plate IV. are given curves of growth constructed from this table, by which it will be seen that the height of girls is always less than that of boys of the same age; while the weight, though the same at twelve years of age, is less both before and after that period.

TABLE No. 17.

Showing Height and Weight of Belgian Children of both Sexes from 5 to 18 years of age. (Quetelet, Anthropométrie, p. 418.)

AGE.	BOYS.				GIRLS.			
	HEIGHT.		WEIGHT.		HEIGHT.		WEIGHT.	
	Inches.	Centim.	Pounds.	Kilo.	Inches.	Centim.	Pounds.	Kilo.
5, . .	38.86	98.7	35.05	15.9	38.35	97.4	33.73	15.3
6, . .	41.18	104.6	39.19	17.8	40.58	103.1	36.82	16.7
7, . .	43.46	110.4	43.43	19.7	42.81	108.7	39.24	17.8
8, . .	45.75	116.2	47.62	21.6	44.97	114.2	41.90	19.0
9, . .	47.95	121.8	51.81	23.5	47.10	119.6	46.29	21.0
10, . .	50.12	127.3	55.55	25.2	49.17	124.9	50.92	23.1
11, . .	52.17	132.5	59.53	27.0	51.21	130.1	56.21	25.5
12, . .	54.14	137.5	63.93	29.0	53.23	135.2	63.93	29.0
13, . .	56.02	142.3	72.96	33.1	55.11	140.0	71.65	32.5
14, .	57.84	146.9	81.80	37.1	56.94	144.6	80.01	36.3
15, . .	59.57	151.3	90.82	41.2	58.60	148.8	88.28	40.0
16, . .	61.18	155.4	100.10	45.4	59.90	152.1	95.90	43.5
17, . .	62.76	159.4	109.51	49.7	60.87	154.6	103.20	46.8
18, . .	64.17	163.0	118.80	53.9	61.53	156.3	109.71	49.8

Unfortunately, observations on the size of growing girls have rarely been made in any country; and it is, therefore, almost impossible to institute the desired comparison. In anthropometrical investigations, the female sex seems to have bee strangely neglected, though, in all questions relating to th growth and development of the race, its importance is at leas equal to that of the male sex. The only accessible observation on girls, except those of Quetelet, seem to have been made i Great Britain. Quetelet himself quotes* the following obse vations made by Cowell among the lower classes of the popul tion of Manchester and Stockport, by which it appears that th relative size of the two sexes varies very much, as in this com munity. The curves on Plate V. show the rate of growth the factory operatives of both sexes, the values of the ordi nates being taken from the above tables. It will be seen tha these curves, though rather irregular, owing to the small num ber of observations from which they are constructed, are ver different in their character from those given by Quetelet; discrepancy to which this author, however, does not allude.

Through the kindness of Mr. C. Roberts of London, th writer has obtained manuscript tables showing the height an weight of children, of both sexes, in various classes of th community. From these records, it is evident that in Eng land girls of 13 years of age are, as a rule, taller and heavie than boys of the same age.

It must, therefore, be assumed either that children in Belgium grow in accordance with a different law from that which is found to prevail in England and with us, or that Quetelet's tables and curves do not truly represent average heights and weights. A consideration of the method by which Quetelet's results were reached renders the latter assumption not improbable. It will be noticed that Quetelet nowhere gives the number of observations on which his average results are based. He speaks, to be sure, of his investigations having extended over a quarter of a century,† and yet he accounts for the small differences between the maximum and minimum heights for the different ages (averaging 17.6 centimeters [6.93 in.] for males, and 19.1 centimeters [7.52 in.] for females) by the statement that *his* observations were limited to individuals "régulièrement con-

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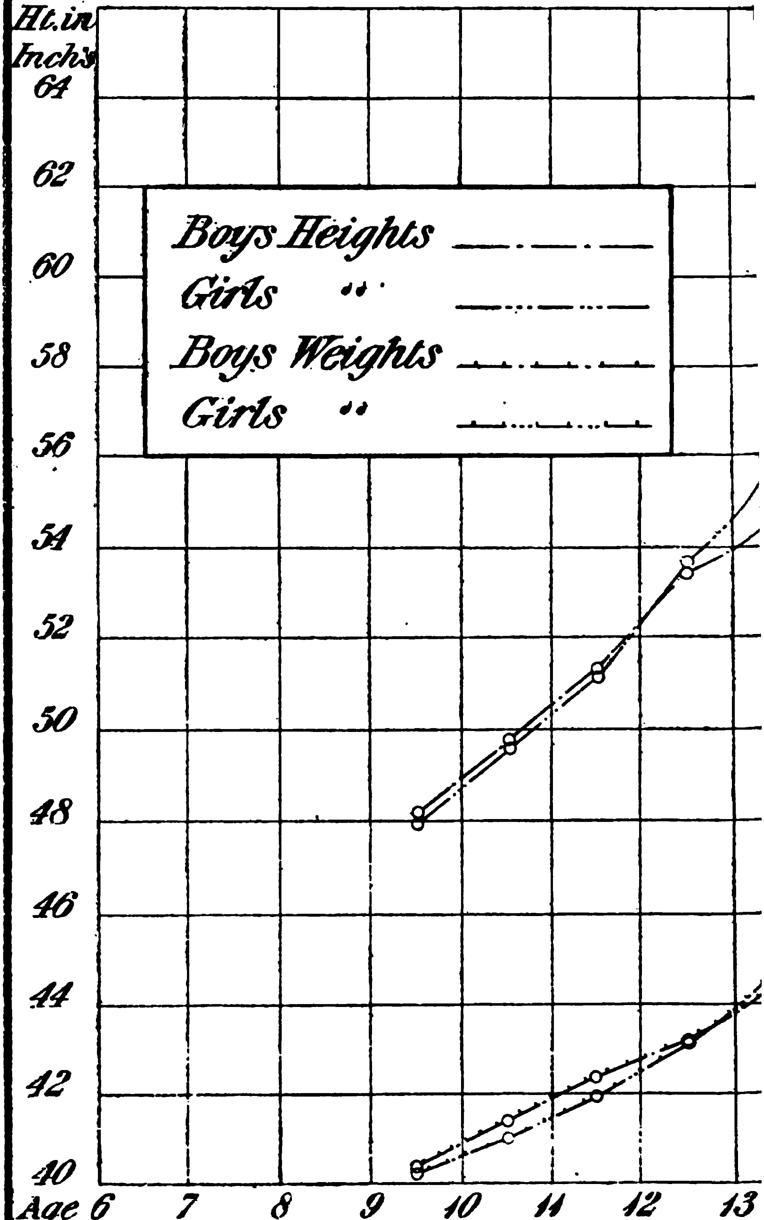
* Sur l'Homme, II. 19 and 51; Original Observations in Parliamentary Reports, 1833, XX., D 1, p. 87.

† Anthropométrie, p. 178.

Plate V. *Showing rate of grow*
in factories of Manchester an



Number of Observations					
Boys Heights	17	48	53	42	
Girls "	30	41	53	80	
Boys Weights	17	48	53	42	
Girls "	30	41	53	80	

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of English children employed Stockport. — Cowell.

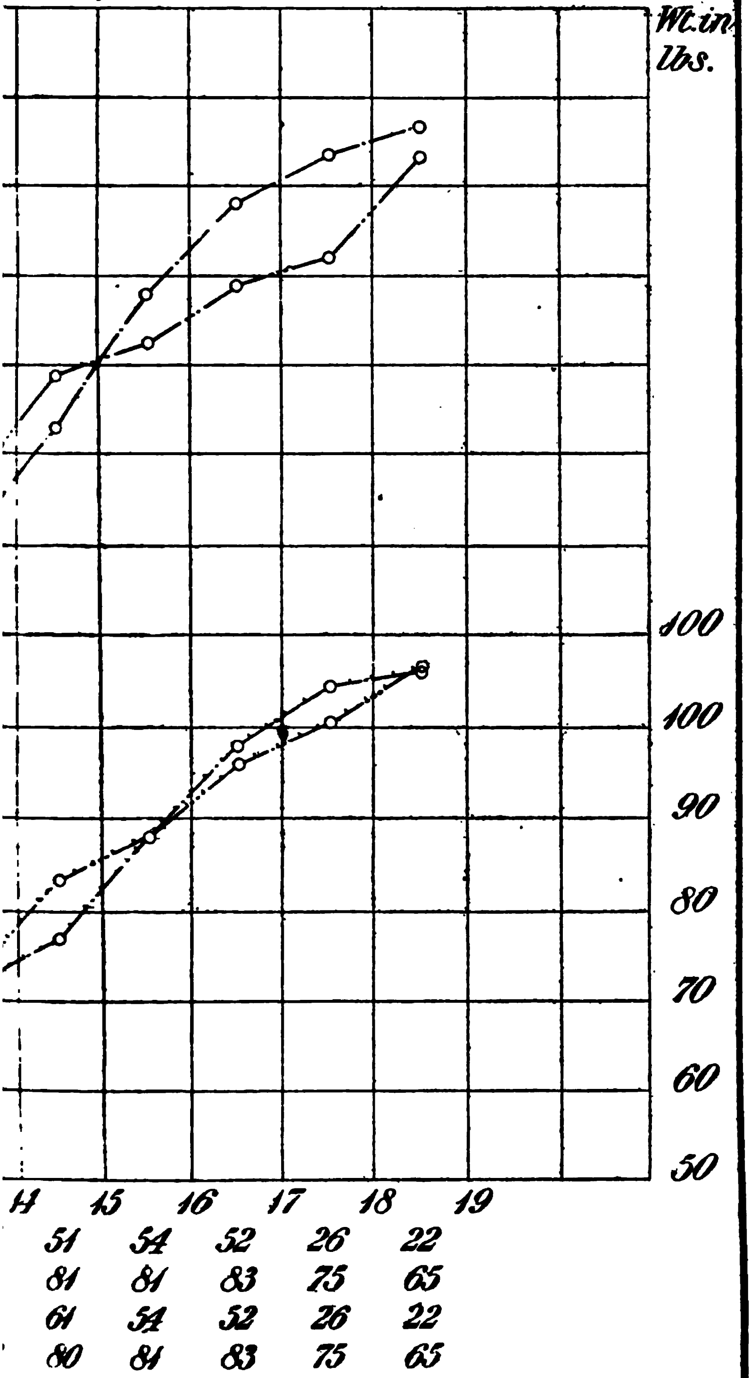

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TABLE No. 18.

Showing Comparative Heights of English Boys and Girls in Manchester and Stockport. (COWELL.)

AGE.	EMPLOYED IN FACTORIES.						NOT EMPLOYED IN FACTORIES.					
	BOYS.			GIRLS.			BOYS.			GIRLS.		
	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.
9,	17	48.139	122.2	30	47.970	121.8	41	48.564	123.3	43	48.438	123.0
10,	48	49.789	127.0	41	49.624	126.0	28	50.650	128.6	38	49.371	125.4
11,	53	51.261	130.2	53	51.155	129.9	25	51.005	129.6	29	52.099	132.3
12,	42	53.380	135.5	80	53.703	136.4	20	52.962	134.5	27	53.666	136.3
13,	45	54.477	138.3	63	55.636	141.3	22	54.977	139.6	18	55.069	139.9
14,	51	56.585	143.7	81	57.745	146.7	16	56.625	144.0	16	58.226	147.9
15,	54	59.638	151.5	81	58.503	148.6	24	58.020	147.4	13	59.153	150.2
16,	52	61.600	156.5	83	59.811	152.1	16	63.201	160.5	6	58.083	147.5
17,	26	62.673	159.2	75	60.413	153.5	20	64.068	162.7	9	60.708	154.2
18,	22	63.318	160.8	65	62.721	159.3	15	69.891	177.5	2	64.750	164.5
Totals,	410			652			227			201		

TABLE No. 19.

Showing Comparative Weight of English Boys and Girls in Manchester and Stockport. (COWELL.)

AGE.	EMPLOYED IN FACTORIES.						NOT EMPLOYED IN FACTORIES.					
	BOYS.			GIRLS.			BOYS.			GIRLS.		
	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilog'ms.
9, ...	17	51.76	23.47	30	51.18	23.18	41	53.26	24.15	43	50.44	22.87
10, ...	48	57.00	25.84	41	54.80	24.85	28	60.28	27.33	38	54.44	24.68
11, ...	53	61.84	28.04	53	59.69	27.06	25	58.36	26.46	29	61.13	27.72
12, ...	42	65.97	29.91	80	66.08	29.96	20	67.25	30.49	27	66.07	29.96
13, ...	45	72.11	32.69	63	73.25	33.21	22	75.36	34.17	18	72.72	32.97
14, ...	61	77.09	34.95	80	83.41	37.82	16	78.68	35.67	16	83.43	37.83
15, ...	54	88.35	40.06	81	87.86	39.84	24	86.83	39.37	13	93.61	42.44
16, ...	52	98.00	44.43	83	96.22	43.62	13	110.30	50.01	6	91.16	41.38
17, ...	26	104.46	47.36	75	100.21	45.44	20	117.80	53.41	9	102.44	46.45
18, ...	22	106.13	48.12	65	106.35	48.22	14	126.30	57.27	2	122.00	55.32
Totals, . . .	420			651			223			201		

straits," and that the number of persons subjected to measurement was "peu considérable."* In the introductory portion of the work, he describes as follows† his method of ascertaining the proportions of the human body: "I contented myself, therefore, with measuring carefully ten individuals of each age, of the male as well as of the female sex, but choosing them in general of a form which could be regarded as regular. The averages of the different groups gave me the condition of development of man from year to year."‡ It seems, therefore, evident that Quetelet's observations were made on a comparatively small number of individuals, selected on account of their more or less close conformity to what was regarded as a normal type. No measurements seem to have been taken except on persons having a "regular form." This determination of the normal type in advance of the measurements must, of course, have been largely a matter of conjecture, and might well have led to the rejection of perfectly healthy and normal individuals whose dimensions did not correspond to a preconceived idea of the typical man or woman. It is therefore probable that if Quetelet's observations had been more numerous and less selected, it would have been found that the curves of growth of the two sexes in Belgium intersect each other much in the same way as in England and in this community.

This view derives confirmation from the admission of Quetelet,§ that the growth of any one individual is far from being as regular as that indicated by the table of averages. He writes: "There are always, in the development of an individual, periods of slow as well as of rapid growth. These anomalies are to be observed about the age of puberty, and especially as the result of diseases. The perfectly normal development of all the physical faculties would require a rare combination of favorable circumstances. In dealing with a large number of individuals, these little anomalies disappear in the general average, and the deficient development of one individual is balanced by the excessive growth of another; at least this is what experiment tends to teach us."

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* Anthropométrie, p. 182.

† Anthropométrie. p. 24.

‡ As a reason for being satisfied with so small a number as ten observations, he states that on dividing the measurements made on thirty individuals into three groups of ten each, so chosen that the average *heights* for all three groups were about alike, he found that the other average measurements of these three groups differed from each other less than might have been expected in three successive measurements made on the same individual.

§ Anthropométrie, p. 183.

In referring to the rate of growth of a boy whose height had been annually recorded, he writes: "It will be noticed that the development was very rapid in the early years of life; then there were slight irregularities of growth between the ages of eight and fifteen years. At this latter period a rapid increase of height took place; and I have noticed the same thing in the case of my son. This increase preceded the age of puberty. Something of the same sort is to be observed in the case of girls, but here it occurs a year or two earlier. It seems, however, that there is nothing constant in the matter; hence these periods of retarded and accelerated growth balance each other to a certain extent, and leave but slight trace of their passage." It seems, therefore, that the period of rapid growth preceding the age of puberty had, in individual cases, attracted Quetelet's attention, though he found no trace of it in his tables of averages, and was inclined to regard it as a pathological result of civilization.* Inasmuch, however, as the phenomenon has in this community and in England, been found to be sufficiently constant and sufficiently marked to impress itself upon the curves representing the averages of large numbers of measurements, it seems reasonable to conclude that if similar methods of investigation (viz., measuring large numbers of individuals and rejecting none except for manifest deformity) had been adopted in Belgium, similar results would have been reached.

The curves of growth of the two sexes being recognized as so distinctly different, it is of interest to inquire what practical application can be made of the knowledge thus acquired. The first question which suggests itself is: How far should this difference in the rate of growth be allowed to modify the system of mental training to which the children of the two sexes are subjected? The physical conditions upon which the manifestation of mental activity depend are too little understood, and the whole question is too complicated to be discussed in this connection, but it seems to be almost self-

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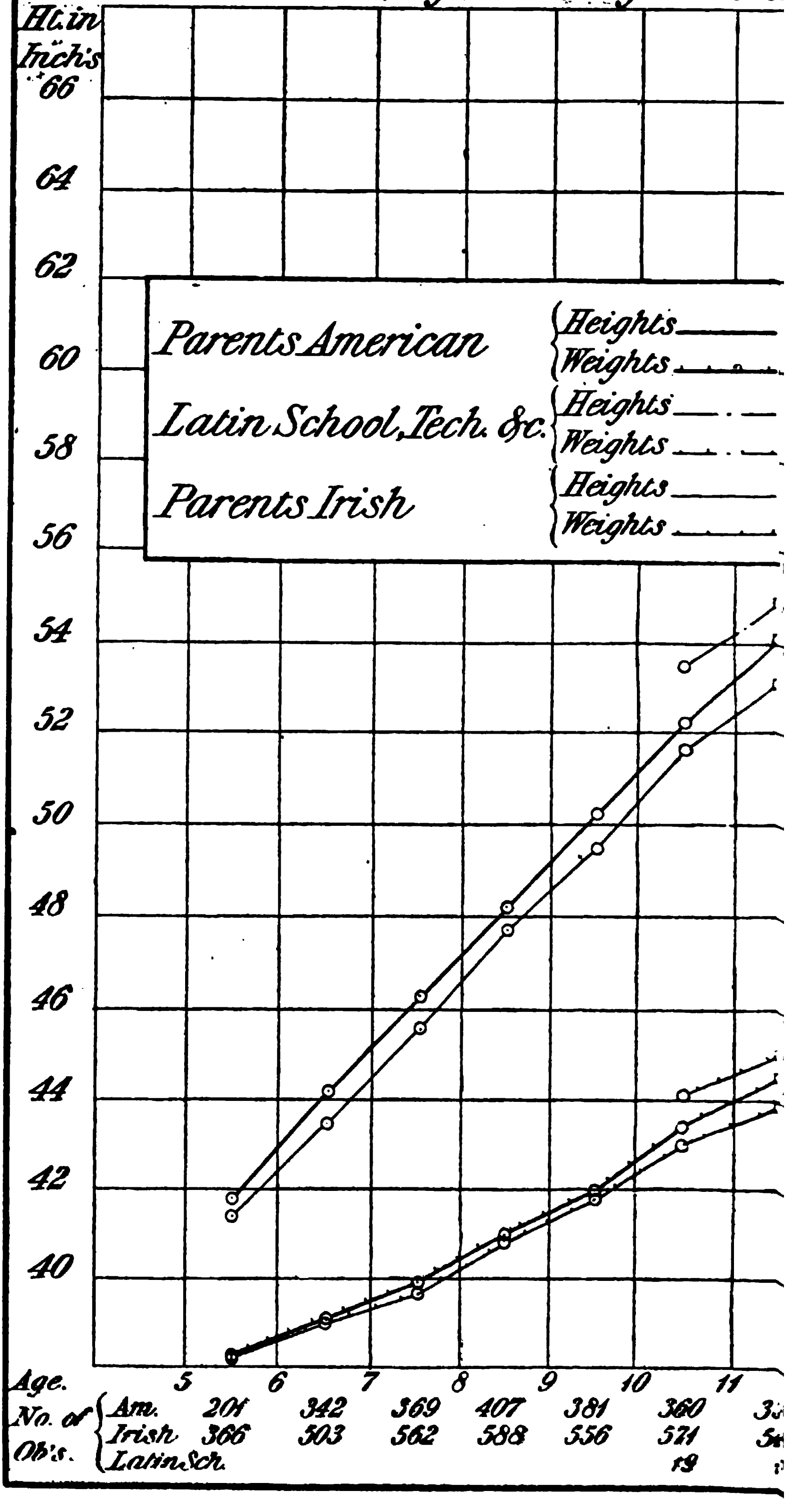
* Du Système Social, p. 24.

Plate VI. *Showing rate of growth*



Boston school boys.

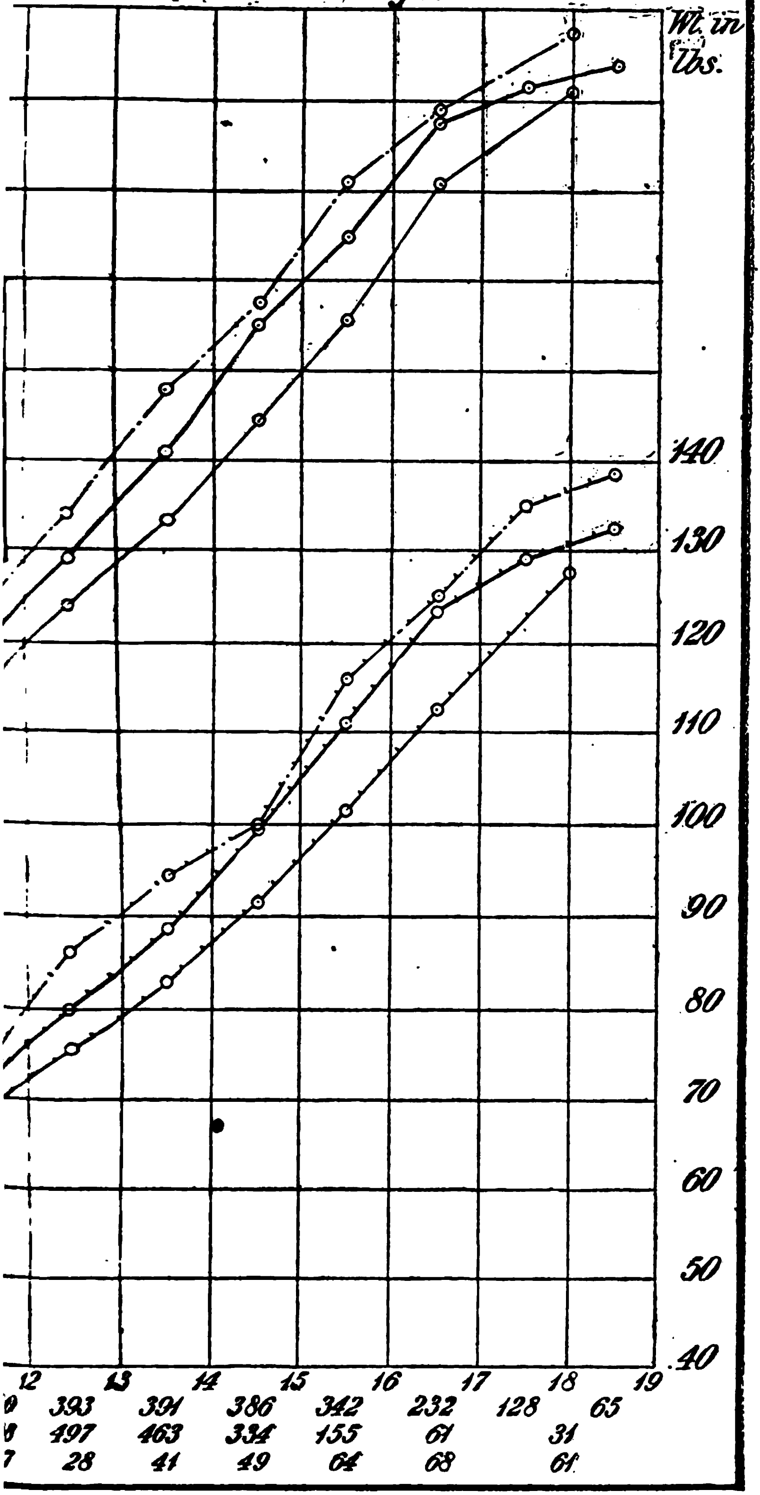


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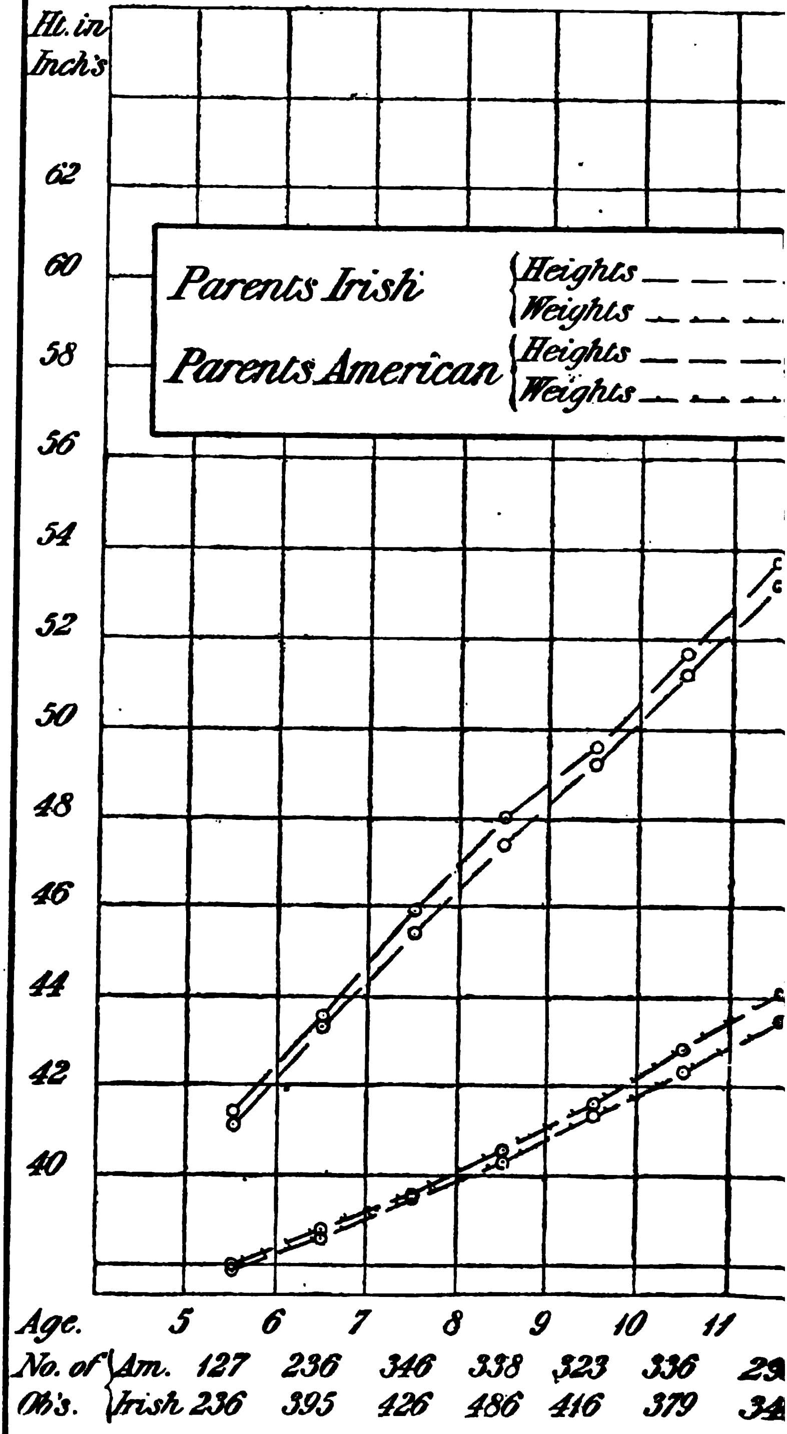
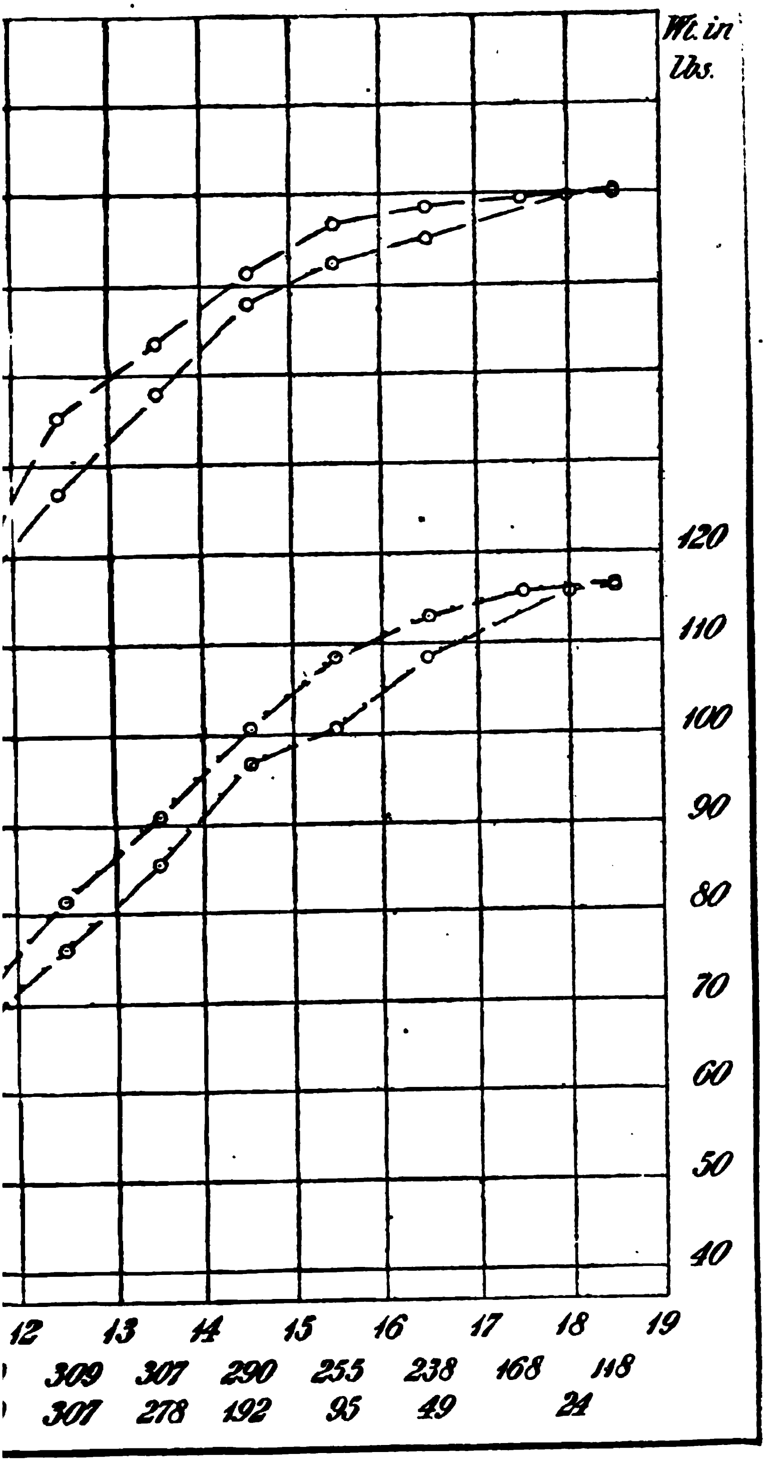
Plate VII. *Showing rate of growt*



A. N. HOUGHTON.

of Boston school girls.



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evident that at those periods when the forces of the organism are engaged in producing rapid growth and development of the physique, the requirements in the way of mental effort should be reduced. The fact that these periods occur at different ages in the two sexes, may therefore be regarded as an argument against the co-education of boys and girls, except during the earlier years of life in which rates of growth are practically the same; *i. e.*, up to ten or eleven years of age. How much importance is to be attached to this argument is a question which demands for its solution an extended series of observations on the annual growth in height and weight of a large number of individuals, taken in connection with a record of their mental progress.

EFFECT OF RACE ON SIZE AND ON RATE OF GROWTH.

An examination of Tables Nos. 1 and 2 shows that boys and girls of American parentage are, almost without exception, both taller and heavier than children of the same age and sex whose parents are of other nationalities. The curves on Plates VI. and VII. illustrate this fact for children of American and Irish parents. It has not been thought desirable to construct curves for the other nationalities, owing to the irregularities which they would necessarily present in consequence of the small number of observations.

In considering this result, the question naturally suggests itself, How far are the superior dimensions of children of American parentage dependent upon differences of race and stock, and how far are they due to other conditions accidentally associated in this community with these differences? Owing to the fact that emigrants to this country belong almost wholly to the poorer classes of the communities from which they come, it is evident that in this city children of American parents must belong to families of greater average wealth, and live, therefore, in greater comfort than children whose parents were born in foreign countries. It is important, therefore, to inquire what effect comfort and misery have upon the growth and development of the human race. Most of the investigations bearing directly upon this point have reference to the influence of these conditions on the size of the full-grown individual, and not on that of growing children.

Thus Villermé* concludes, as the result of his investigations, that "the stature is greater and the growth sooner completed, all other things being equal, in proportion as the country is richer and the comfort of its inhabitants more general." On the other hand, Boudin,† from an examination of the measurements of recruits to the army in different departments of France, arrives at the conclusion that stature is, to a great extent, "independent of comfort and misery, and is, on the contrary, closely connected with race." Villermé's results, as far as the duration of the period of growth is concerned, have also been disputed by Dr. Gould,‡ who has shown most conclusively that in the United States where "misery, in the sense of excessive poverty, affecting the supply of nutriment, physical protection from the weather and needful rest, hardly exists, the epoch of full development appears to be later than in any other country," the maximum height being attained between the thirty-first and thirty-fourth years. The effect of privations and exposure in preventing the attainment of the normal height, is, however, clearly pointed out by this writer,§ and is regarded by him as the cause of the small stature of sailors as compared with that of soldiers of the same age and state of enlistment. A similar conclusion in regard to the age at which the full stature is attained, has been reached by Dr. Baxter,‖ as the result of an examination of the records of the Provost-Marshal-General's Bureau. It would, however, be manifestly unsafe to argue with this writer,¶ that "if comfort and plenty do not hasten growth, but, on the contrary, coexist with an unusually tardy and prolonged development of it, as is shown to be the case in the United States, it is fairly to be inferred that they exert little if any influence in increasing the stature"; for a prolongation of the period of growth must necessarily result in an increased stature unless the *rate* of growth is at the same time proportionately diminished, and that comfort and plenty should have the latter effect is not only in itself highly improbable, but is opposed to such evidence as we have on the subject. Moreover, Dr. Baxter has himself shown* that of the 501,068 individuals, the records of whose examinations are preserved in the Provost-Marshal-General's Bureau, the natives of the United States are taller than those of any other country. He calls attention † also to the fact that natives of foreign countries enlisting in the United States have a greater average height than natives of the same countries enlisting at home. He is inclined, however, to explain this circumstance by a difference in the average age of the individuals measured; but Dr. Gould ‡ has shown, that making allowance for differences of average age and of minimum limit of stature for military service, in different countries, the conclusion is unavoidable that natives of European countries who enlist in America are, on the average, taller than those who enlist at home. In searching for the causes which give to Americans, and even to persons growing up in America, though not born there, this superiority of stature, it seems not unreasonable to attribute a certain importance to the greater average comfort of the inhabitants. The prolonged period of growth in this country is certainly not to be regarded as an argument against this view, for, in the absence of any evidence of a diminished rate of growth, this may well be regarded as a result of abundant nutrition.

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* Quoted by Dr. Gould. Investigations in the Military and Anthropological Statistics of American Soldiers. U. S. Sanitary Commission, p. 120.

† Recueil de mémoires de Médecine, de Chirurgie et de pharmacie militaires, Paris, 1863. Vol. IX., p. 181.

‡ Loco citato.

§ Op. cit., p. 132.

‖ Statistics Medical and Anthropological. Washington, 1875.

¶ Op. cit., p. 20.

Statistics from which evidence can be drawn as to the effect of comfort and misery on the size of growing children are not numerous. The observations of Quetelet, Villermé, and Cowell § seem to show that in a given community the children of the wealthier classes are, as a rule, larger than those of the poorer classes. The following table, for which I am indebted to the kindness of Mr. Roberts, throws light upon this question.

An examination of this table shows that children of the laboring classes, inhabiting towns, are, at all ages, decidedly shorter than the children of the non-laboring classes attending public schools and universities, the difference attaining a maximum of over four inches at thirteen years of age. The difference of weight is also, as a rule, decidedly in favor of

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* Op. cit., p. 23.

† Op. cit., p. 16.

‡ Op. cit., p. 180.

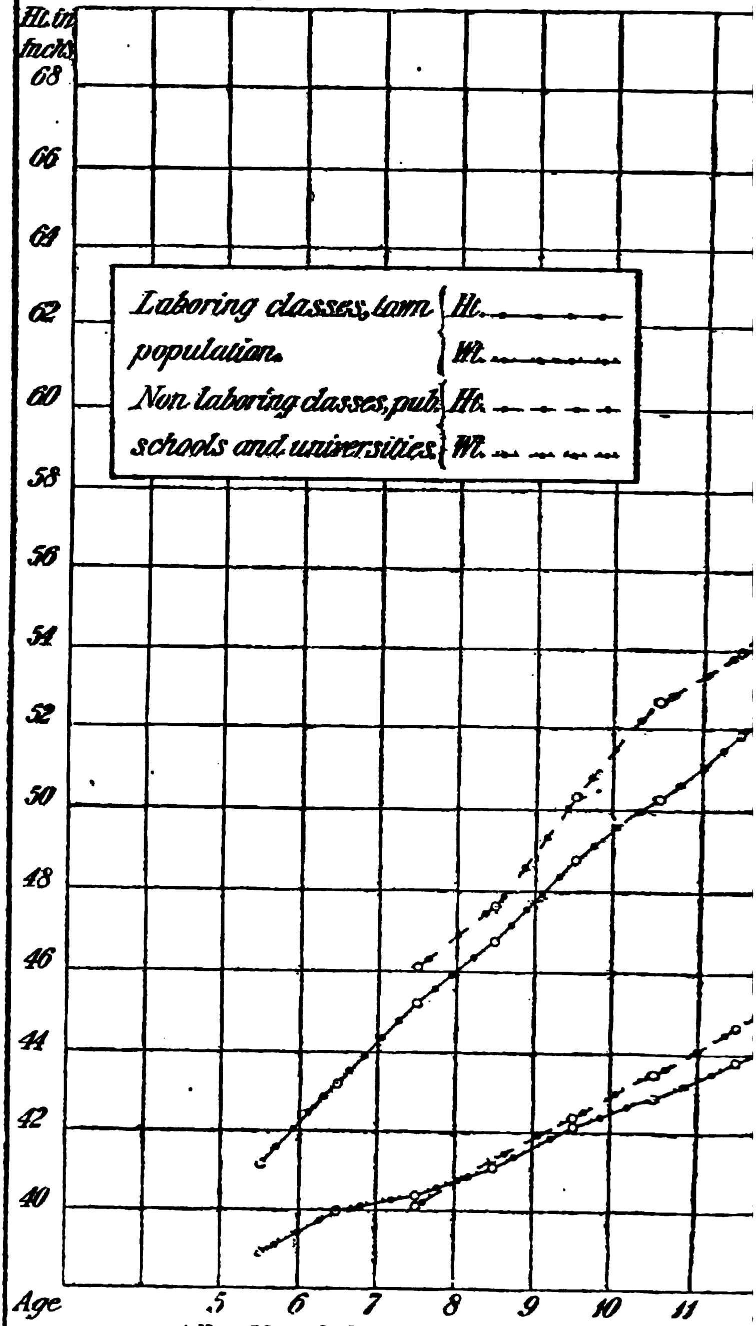
§ Ludwig: Physiologie, II., 717.

TABLE NO. 20.

Showing Average Height and Weight of English Boys.—(ROBERTS.)

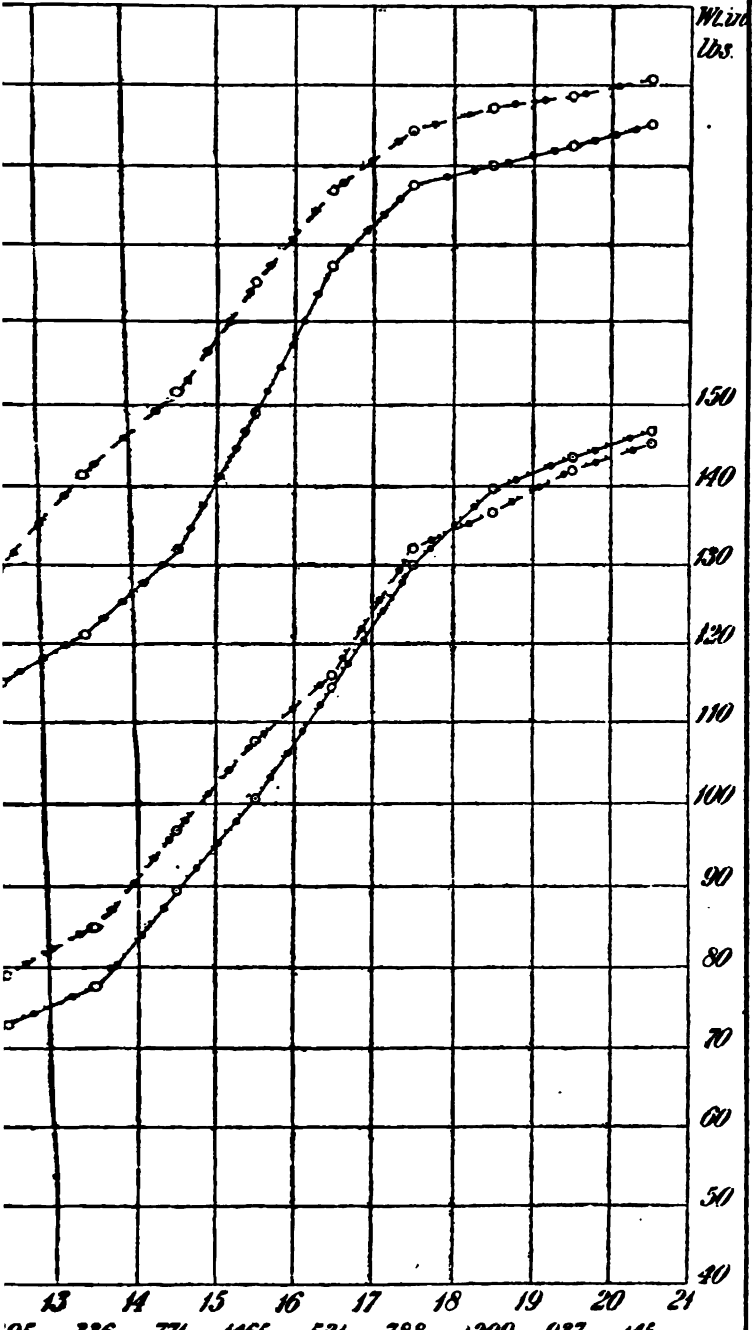
AGE AT LAST BIRTHDAY.	LABORING CLASSES, TOWN POPULATION ONLY.				NON-LABORING CLASSES, PUBLIC SCHOOLS, UNIVERSITIES, ETC.			
	HEIGHT WITHOUT SHOES.		WEIGHT IN ORDINARY CLOTHES.		HEIGHT WITHOUT SHOES.		WEIGHT IN ORDINARY CLOTHES.	
	No. of Observations.	Inches.	No. of Observations.	Pounds.	No. of Observations.	Inches.	No. of Observations.	Pounds.
5, ...	175	41.15	175	44.20	-	-	-	-
6, ...	387	43.18	327	49.68	-	-	-	-
7, ...	581	45.15	581	51.89	3	46.10	4	50.16
8, ...	670	46.81	675	55.15	16	47.66	18	56.40
9, ...	823	48.82	851	60.58	61	50.30	60	61.96
10, ...	749	50.28	829	64.59	235	52.65	238	67.22
11, ...	621	51.83	784	69.00	430	53.93	429	73.31
12, ...	495	53.02	490	72.78	745	55.90	747	78.96
13, ...	336	54.24	336	77.38	969	58.30	974	85.27
14, ...	771	56.37	771	89.39	990	60.27	992	96.40
15, ...	1,465	59.81	1,465	100.66	819	63.00	820	107.25
16, ...	531	63.45	529	114.55	462	65.34	462	115.96
17, ...	788	65.50	773	130.45	313	66.91	317	131.93
18, ...	1,209	66.00	1,203	139.50	300	67.38	296	136.68
19, ...	937	66.50	937	143.00	344	67.74	344	142.00
20, ...	145	67.00	145	146.55	262	68.09	260	145.23

Plate VIII. *Showing comparative rate of g*
non laboring classes.



			5	6	7	8	9	10	11
No. of Obs.	Laboring	Ht.	175	357	581	670	823	749	621
		Wt.	175	327	581	675	851	829	784
	Non labʳng	Ht.			3	16	61	235	430
		Wt.			4	18	60	238	429

of English Boys of the laboring and the



95	336	771	1465	531	788	1209	937	145
90	336	771	1465	529	773	1203	937	145
15	969	990	819	462	313	300	344	262
47	974	992	830	462	317	296	344	260

the non-laboring classes, the exceptions being chiefly between the ages of eighteen and twenty-one. These facts are rendered apparent by the curves constructed on Plate VIII.

In searching for the cause of this great disparity in size, it is to be noticed, in the first place, that the laboring classes in the above table are taken from the town population only, while in the case of the non-laboring classes no such restriction is observed. In the absence of exact information as to the way in which these statistics were obtained, it is difficult to draw positive conclusions, but it is probable that the influences which tend to produce a physical degeneration of urban populations,* exhibit here their effect upon the size of growing children. This tendency of city life depends upon the fact that, in the struggle for existence, physical vigor plays, in cities, a less decisive part than in the country, owing to the greater number of sedentary occupations and trades there presenting themselves, which, for their successful prosecution, neither demand nor favor a full development of the physique. It is difficult to decide how much importance should be attached to this consideration in the present case; but it must be borne in mind that wealth implies ability to choose one's occupation, and that, in England at least, an occupation exclusively sedentary is rarely adopted, except from necessity. Hence, if the term "comfort" be used to include all the favorable conditions, alimentary, hygienic, etc., which can be secured by wealth, it seems fair to conclude that, in view of the stationary character of the English population, and of the small variety of climatic conditions to which it is exposed, the above-mentioned disparity in size must be mainly due to the greater comfort enjoyed by the non-laboring classes.

If this view is correct, it seems reasonable to suppose that the difference in size between Boston school children of American and those of Irish parentage may be, to some extent, dependent upon the greater comfort and luxury in which the former live and grow up. Whether the whole difference can be thus accounted for, or whether some other agency is concerned in bringing about this result, is a question which must be next considered.

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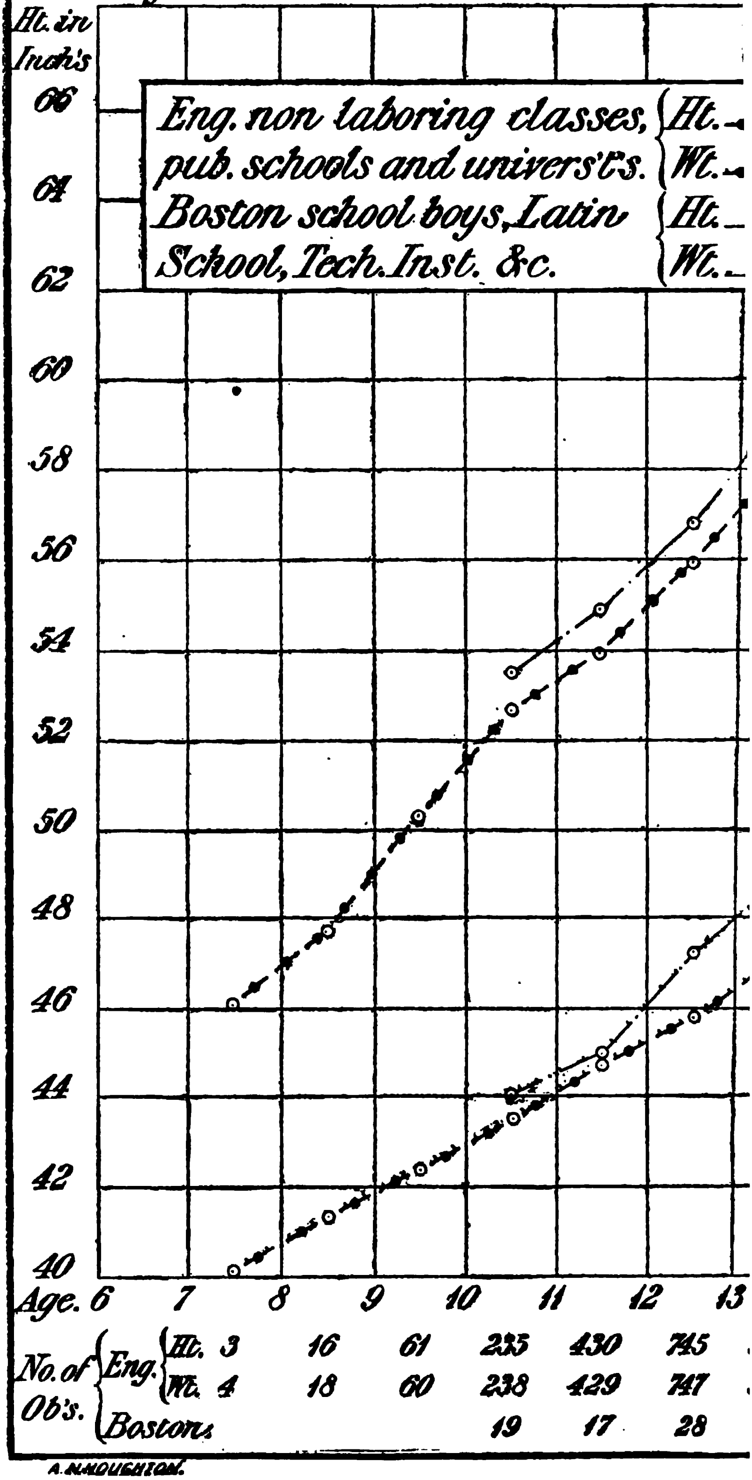
* See De Candolle's Histoire des Sciences et des Savants, p. 368.

We have already seen that, according to Dr. Baxter's and Dr. Gould's investigations, the average height of the *adult* native American is greater than that of the native of any other country, and that natives of other countries, growing up in America, acquire a greater height than natives of the same countries growing up at home. We must now inquire whether similar conclusions can be reached in regard to the size of *growing children;* and in order to eliminate the effect which comfort and misery may have on the rate of growth, it is important to select, for comparison, sets of observations made upon children belonging to corresponding classes in the communities in which they live. If a comparison is made between the children of the non-laboring classes in the English public schools and universities (see Table No. 20) and the Boston school boys of American parentage (see Table No. 1), it will be seen that there is very little difference in the heights of the two sets of boys, and that the curves of growth, if constructed on the same sheet, would intersect each other at seven different points, and be nearly coincident through their whole course. In regard to weight, the American boys are, up to twelve years of age, lighter; from twelve to seventeen years heavier, and then again lighter, than English boys of the same ages. It is, however, manifest that the boys, whose dimensions are thus compared, cannot be regarded as belonging to corresponding classes in their respective communities; for there are, doubtless, a large number of native Americans to be found in the laboring classes of this city. In order to obtain a set of observations more comparable to those made on the children of the non-laboring classes in the English public schools and universities, the following table has been prepared by bringing together the measurements of the pupils of American parentage attending the public Latin School, the Massachusetts Institute of Technology, and the private Latin School of Mr. J. P. Hopkinson. It is believed that these pupils represent a class in the community corresponding sufficiently well in social condition to that class in England which sends children to the public schools and universities. A comparison of the two sets of figures shows the superiority of the American boy

Plate IX. *Showing comparative r*

Boys.



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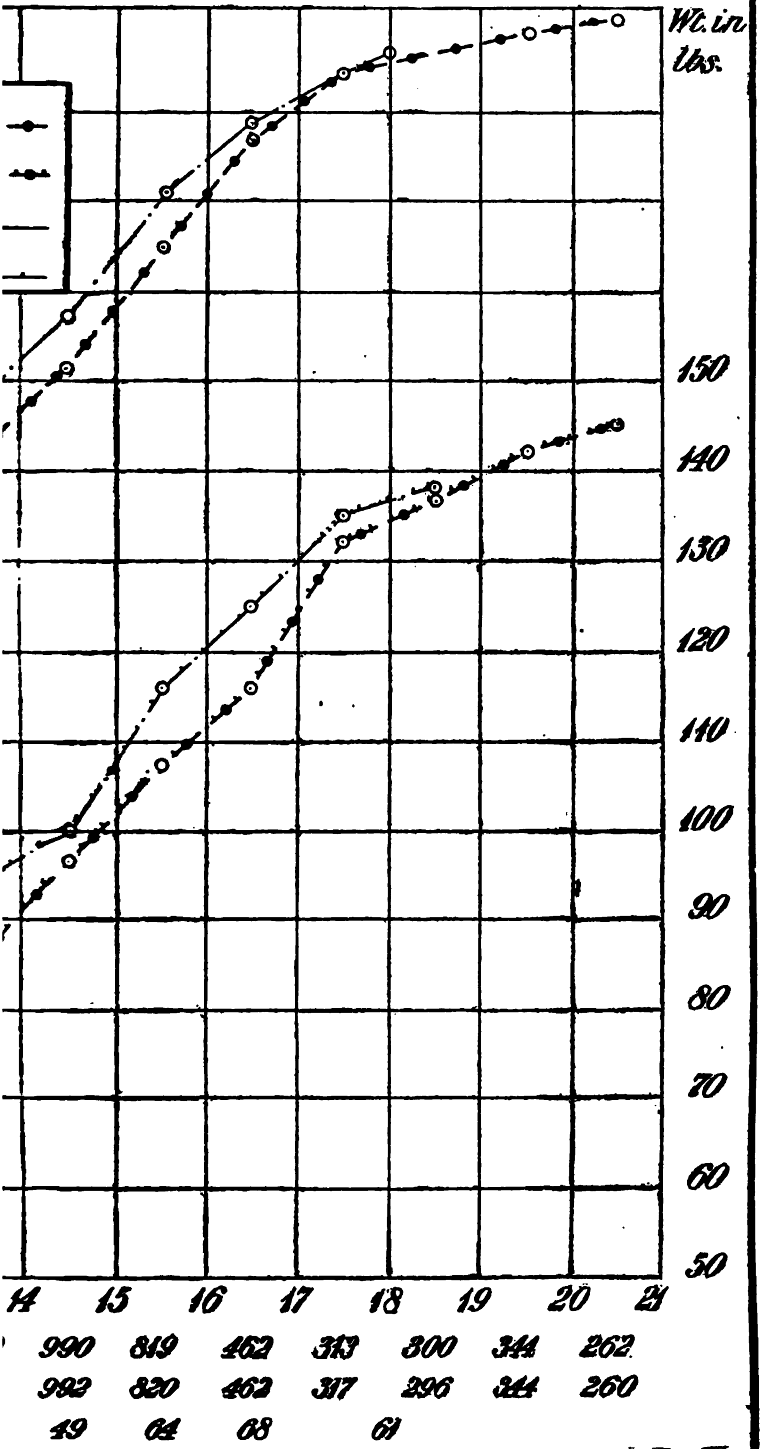
f growth of English and American



both in height and weight.* The difference is rendered at once apparent by an inspection of the curves on Plate IX. It seems, therefore, that there are influences prevailing in this community, other than those connected with the comfort or misery of existence, which give to a growing boy a greater height and weight than are attained by an English boy of the same age. While, therefore, the conclusions of Gould and of Baxter, as to the superior height of the adult native American, are found to be equally applicable to growing children, we find also here evidence that this superiority of stature is not dependent *solely* upon the more abundant distribution of the comforts of existence in this country, though for the reasons given above (p. 295) it seems probable that the difference is to be *partly* accounted for in this way.

Table No. 21.

Showing Average Height and Weight of Boston School-boys of American Parentage attending Public Latin School, Private Latin School, and Massachusetts Institute of Technology.

Age at last Birthday.	No. of Observations.	Height without Shoes.		Weight in ordinary Dress.	
		Inches.	Centimeters.	Pounds.	Kilograms.
9, ...	2	52.00	132.1	60.1	27.27
10, ...	19	53.51	135.9	70.6	32.03
11, ...	17	54.90	139.4	75.3	34.16
12, ...	28	56.78	144.2	85.9	38.97
13, ...	41	59.60	151.4	94.4	42.83
14, ...	49	61.51	156.3	99.9	45.32
15, ...	46	64.20	163.1	116.0	52.62
16, ...	40	65.83	167.2	125.8	57.07
17, ...	32	67.44	171.3	135.2	61.31
18, ...	29			138.2	62.69
Total, . . .	303				

In view of this result, it is reasonable to assume that the superior size of children of American parentage in the Boston schools is due in part to the greater comfort in which they live and grow up, and in part to other conditions which may be described collectively as differences of race or stock. To which of these agencies in bringing about the result the greater importance is to be attributed, is a question which we are at present without the means of deciding. Some light might be thrown upon the subject by tabulating the observations for each nationality according to the occupation of the parents, and it is possible that at some future time, should circumstances favor the undertaking, the data now on hand may be utilized in this way.

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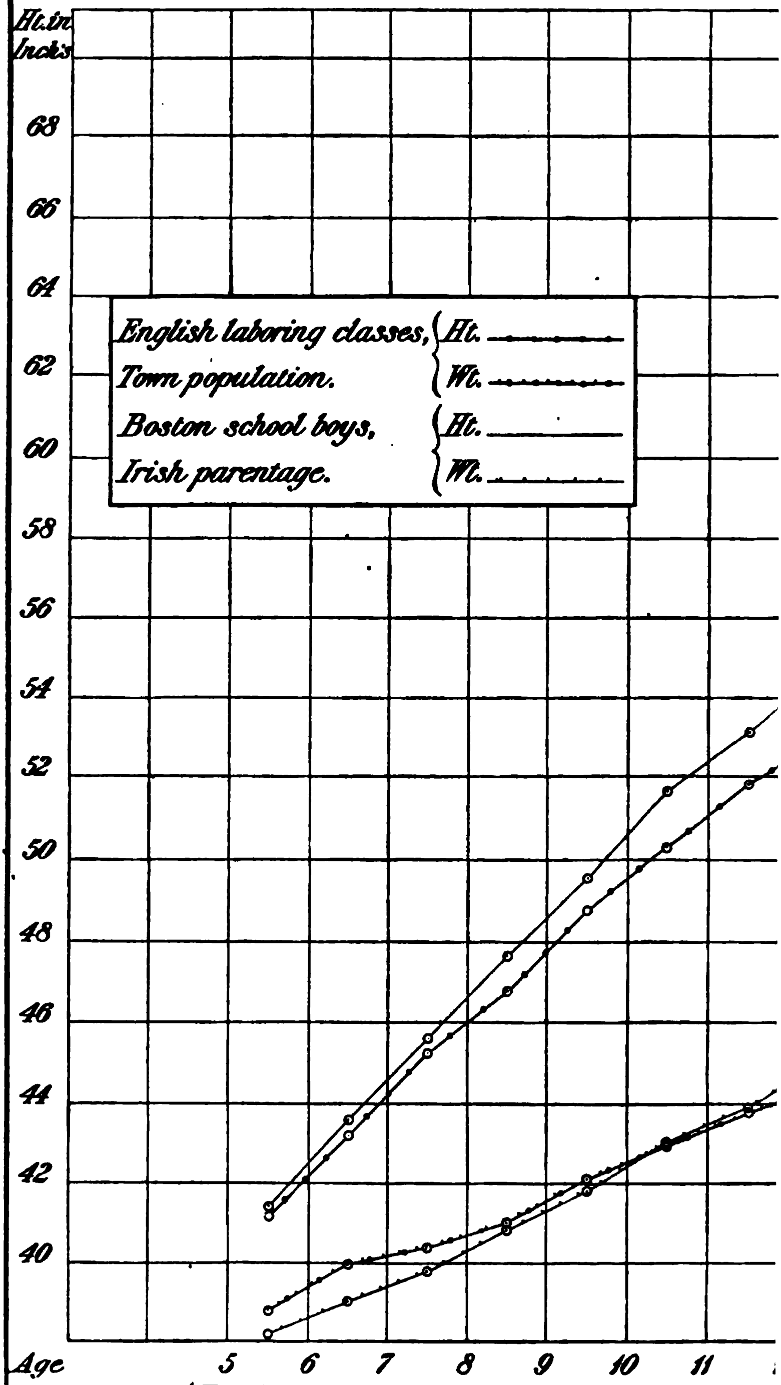
* In confirmation of this result, it is interesting to note the statement made to the writer by a lady of his acquaintance, that London dealers in ready-made children's clothing recommend, to American customers, sizes adapted to English children one year older than those for whom the garments are purchased.

The curves showing the rate of growth of the above-mentioned selected American boys have been introduced into Plate VI. for comparison with the curves corresponding to the observations on children of American and of Irish parentage. It is evident that the superior size of these boys, in comparison with the average boys of American parentage attending the public schools, cannot be attributed exclusively to either of the factors which have been recognized as influencing the dimensions of growing children; for in the first place, the comfort in which the pupils of these selected schools live and grow up must be greater than that enjoyed by the *generality* of children of American parentage attending the public schools; and in the second place, their ancestors for several generations are probably, in the majority of cases, American; while the children with whom they are compared, though of American parentage, doubtless have, in a great many instances, foreign grandparents. Hence, whatever tendency residence in America may have to increase the size of growing children, will, in their cases, be intensified by transmission through several generations.

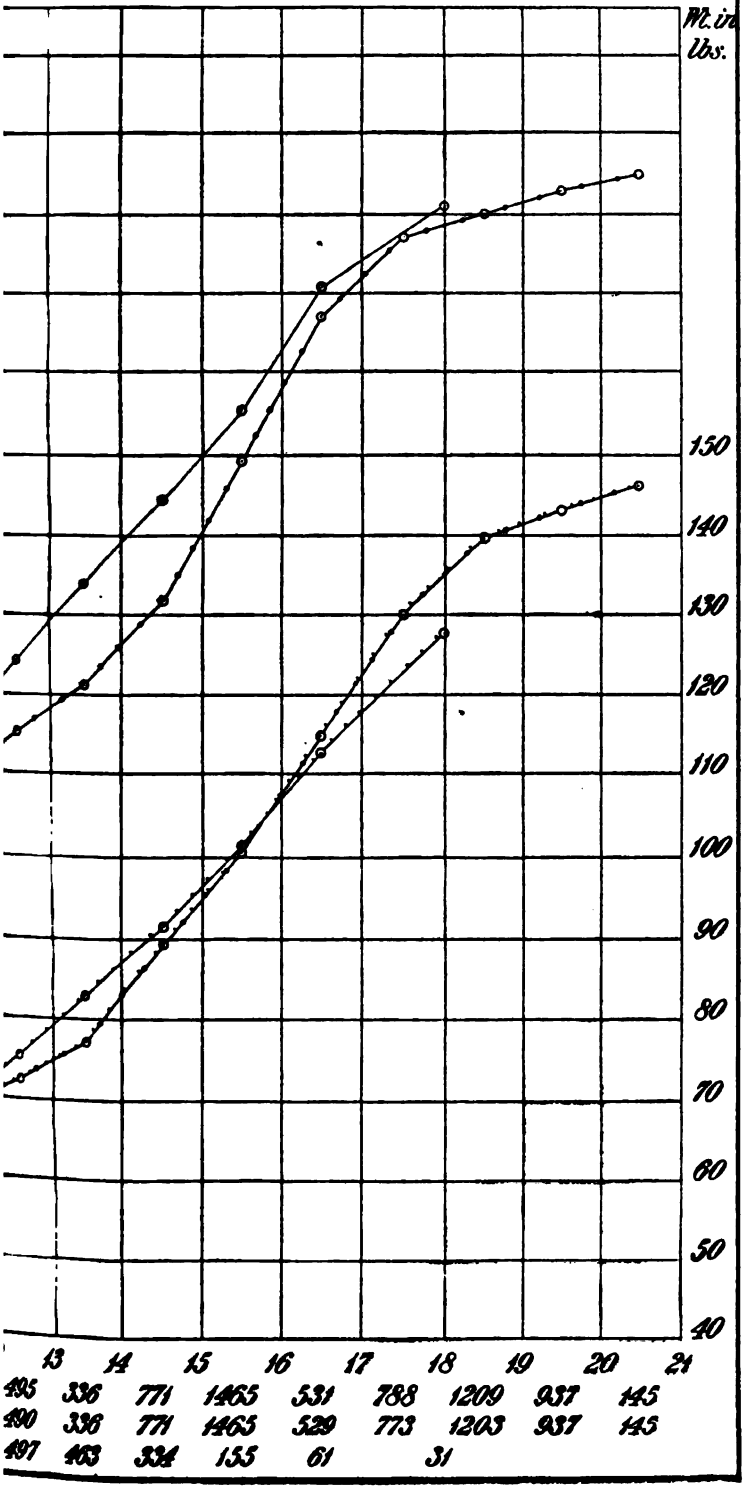
The characteristics which distinguish the various races of men result from slow modifications of a common ancestral type by the action through successive generations of the varying conditions under which growth and development take place. It is therefore interesting to inquire how *quickly* the type of a race may be altered by a change in the external conditions of development. We have already seen that, as far as the height of the adult individual is concerned, a single generation is, according to Dr. Gould, sufficient to produce a marked effect. A most striking proof of this statement is

Plate X. *Showing comparative rate of grow*



No. of Ob's.								
English	Ht.	175	387	581	670	823	749	621
	Wt.	175	327	581	675	851	829	784
Boston		336	503	562	588	556	571	548

of English and American Boys.



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afforded by the tables given by this writer,* showing that natives of New England and New York enlisting in the Western States have, at all ages from eighteen years upwards, a greater average height than natives of the same regions enlisting at home, thus approximating to the stature of the natives of those States where they grew up and enlisted. It was hoped at the beginning of this inquiry that it might be possible to ascertain whether local conditions have a similar effect on the size of growing children, but it has been found impossible to collect data which will warrant any positive conclusions on this subject. The only foreign nation largely represented in this community is the Irish; and all attempts by correspondence with English statisticians to discover any record of observations on the size of Irish children in their native country have been unavailing. A comparison may be instituted between the children of the laboring classes in England (see Table No. 20) and those of Irish parentage in this community (see Table No. 1); and the difference shown by the curves on Plate X. is, as far as height is concerned, in favor of the Boston children; while in regard to weight, the English children are at first heavier, then lighter, and then again heavier than Boston children of the same ages. Conclusions as to the effect of climatic conditions on the size of growing children could, however, be drawn from this comparison only on the assumption, first, that among the laboring classes the size of Irish children does not differ greatly from that of English children; secondly, that the children of Irish parents in this community belong wholly, or in a large proportion, to the laboring classes; and thirdly, that the condition of the laboring classes in this community is comparable, as to comforts of life, with that of the laboring classes of England. None of these assumptions can be safely made, and it must therefore remain doubtful to what cause the difference of size between the two sets of children (amounting at thirteen years of age to over two inches in height) is really to be attributed.

A comparison between the heights of boys of German parentage in this city and that of growing boys in German cities is not without interest. The following table shows in parallel columns the heights of boys measured in Berlin by Schadow, and of boys measured in Cologne by Angerstein, compared with the heights of boys of German and American parentage attending the schools of this city. The curves on Plate XI. have been constructed from the figures of this table (the curve of growth of children of American parents being omitted in order not to confuse the diagram). It will be noticed that while the curves of growth of boys living in the German cities indicate a great difference in the rate of increase before and after eleven years of age, the rate of growth of boys of both German and American parentage in this city is much more uniform throughout the whole growing period.

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* Op. cit., pp. 126, 127.

TABLE No. 22.

Showing Comparative Rate of Growth of American and German Boys.

AGE.	BERLIN. (SCHADOW.)		COLOGNE. (ANGERSTEIN.)		BOSTON.			
					GERMAN PARENTAGE.		AMERICAN PARENTAGE.	
	Inches.	Centim.	Inches.	Centim.	Inches.	Centim.	Inches.	Centim.
5, .	43.24	109.8	–	–	41.08	104.3	41.74	106.0
6, .	45.32	115.1	–	–	43.50	110.5	44.10	112.0
7, .	46.34	117.7	46.31	117.6	45.25	114.1	46.21	117.4
8, .	47.35	120.3	47.83	121.5	47.13	119.7	48.16	122.3
9, .	48.40	122.9	48.90	124.2	48.85	124.1	50.09	127.2
10, .	49.38	125.4	50.43	128.1	51.21	130.1	52.21	132.6
11, .	51.45	130.7	51.97	132.0	52.92	134.4	54.01	137.2
12, .	54.57	138.6	54.54	138.5	54.55	138.6	55.78	141.7
13, .	57.65	146.4	58.67	149.0	56.70	144.0	58.17	147.7
14, .	60.71	154.2	61.77	156.9	59.14	151.2	61.08	155.1
15, .	65.91	167.4	64.34	163.4	62.06	157.6	62.96	159.9
16, .	–	–	65.88	167.3	64.75	164.4	65.58	166.5
17, .	–	–	66.40	168.6			66.29	168.4
18, .	–	–	66.91	169.9			66.76	169.5

The figures in the above table, representing the heights of Berlin and Cologne boys, though apparently averages of a number of observations, are really more of the nature of estimates. This is evident from an examination of the original tables as given by Angerstein,* where the heights for each age are, in most instances, expressed in an even number of German inches. Moreover, the observations on boys of German

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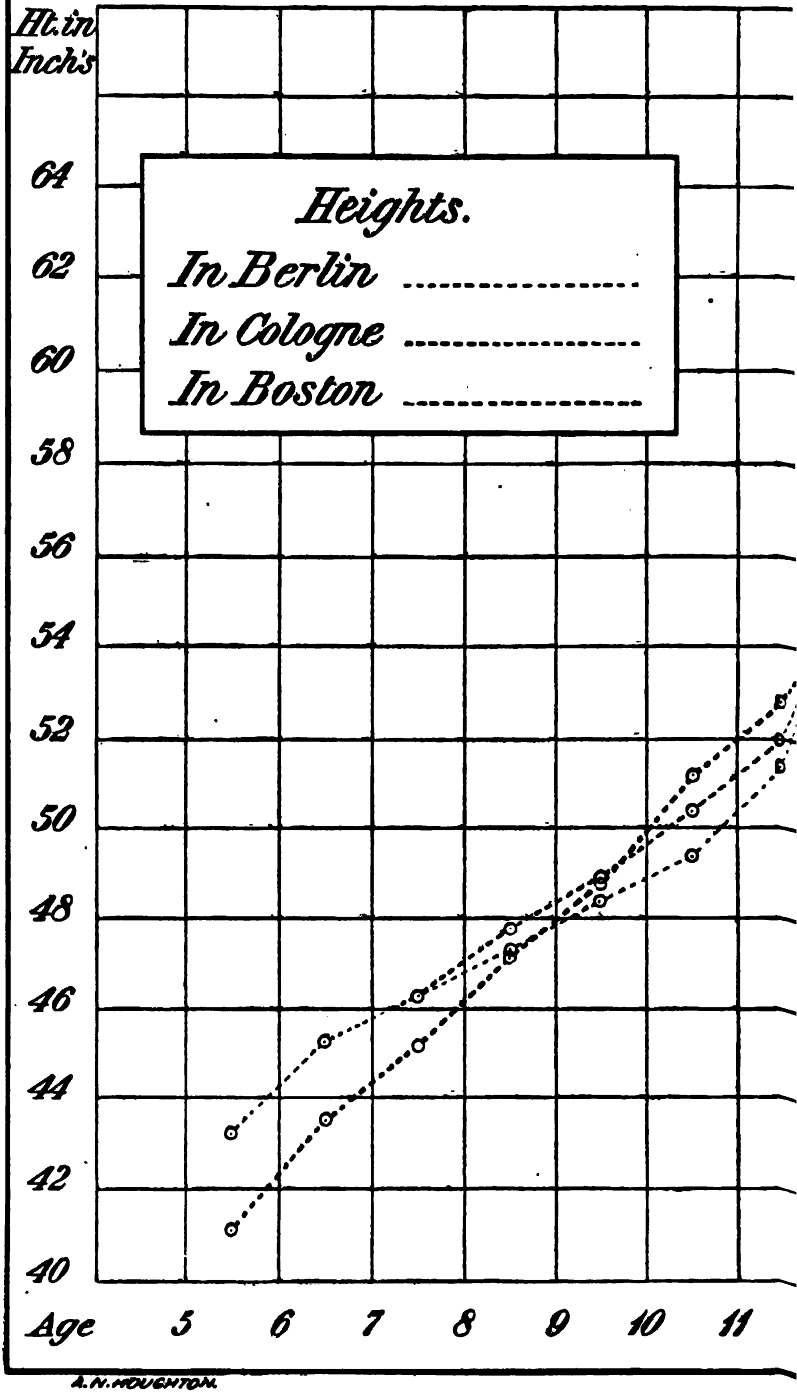
* Deutsche Turnzeitung, 1864, p. 326.

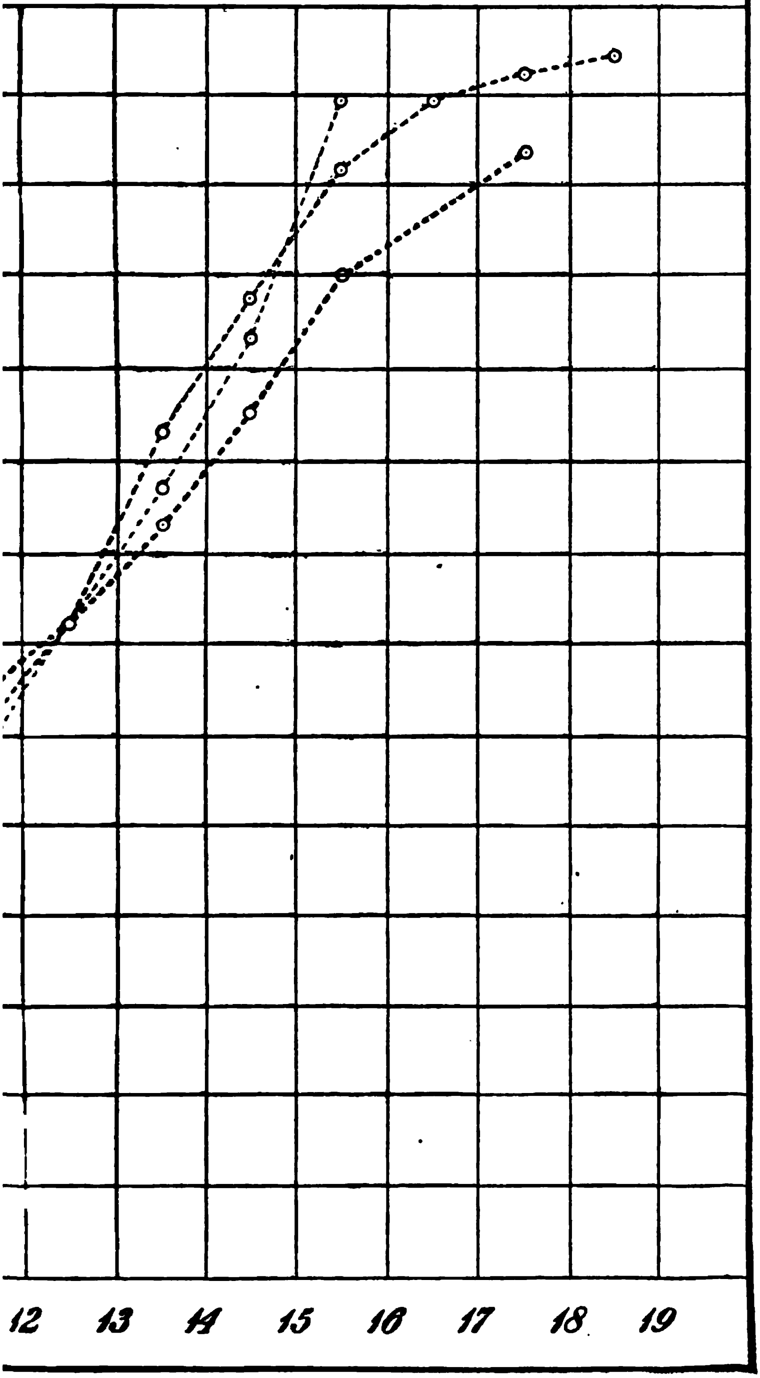
Plate XI. *Showing rate of growth*

and in America.



A. N. HOUGHTON.

of German boys in Germany



parentage in this city are few in number (752 of all ages), and there has been no attempt to distinguish between natives of different parts of Germany. It is therefore impossible to draw positive conclusions on the subject; but the evidence, as far as it goes, seems to indicate that even in the first generation after emigration, the rate of growth has been modified by new external conditions.

Relation of Height to Weight.

The data collected in this investigation afford the means for ascertaining the relation of height to weight in growing children of both sexes and of various races. This relation is for each age most simply expressed by the quotient of the weight in pounds divided by the height in inches. Series of quotients thus obtained are given in Table No. 3, in the columns headed "pounds per inch." Since, however, these quotients increase with the increasing height,* it is manifestly impossible to use them for ascertaining the relative stoutness of children who at a given age differ from each other in stature. To do this with absolute accuracy, it would be necessary to determine for each age, and in each set of observations, the average weight corresponding to each height. Since, however, the direct determination of this value would necessitate a complete retabulation of all the observations, it has been thought best to adopt an indirect and somewhat less accurate method of getting at the result. This method consists in arranging the heights and weights corresponding to each age, opposite to each other in parallel columns, and then determining by interpolation the weights corresponding to each even inch of height.†

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* Uniform growth in all dimensions would of course cause the weights of growing children to vary as the cubes of the heights, but since growth is more rapid in the vertical than in the lateral dimensions, the weights increase approximately as a lower power of the heights. A logarithmic equation, however, as given in the appendix to this article, expresses the relation much more accurately. For a discussion of the question the reader is referred to the works of Quetelet and Gould.

† This method is defective, first, because it does not take into account the possible influence of age upon the ratio of a given height to its corresponding weight; and secondly, because it rests upon the assumption that the average weight for a given age is the same as the average weight of all individuals, without regard to age, whose height is equal to the average height for that age. This assumption clearly involves a trifling error, for, since the weights of growing children increase approximately as the 2.7 powers of the heights, it is evident that at any given age the weight of those children

The results of this calculation are given in Tables Nos. 23 and 24, which show for every inch of height the corresponding weight of growing children of both sexes and in various conditions of life.

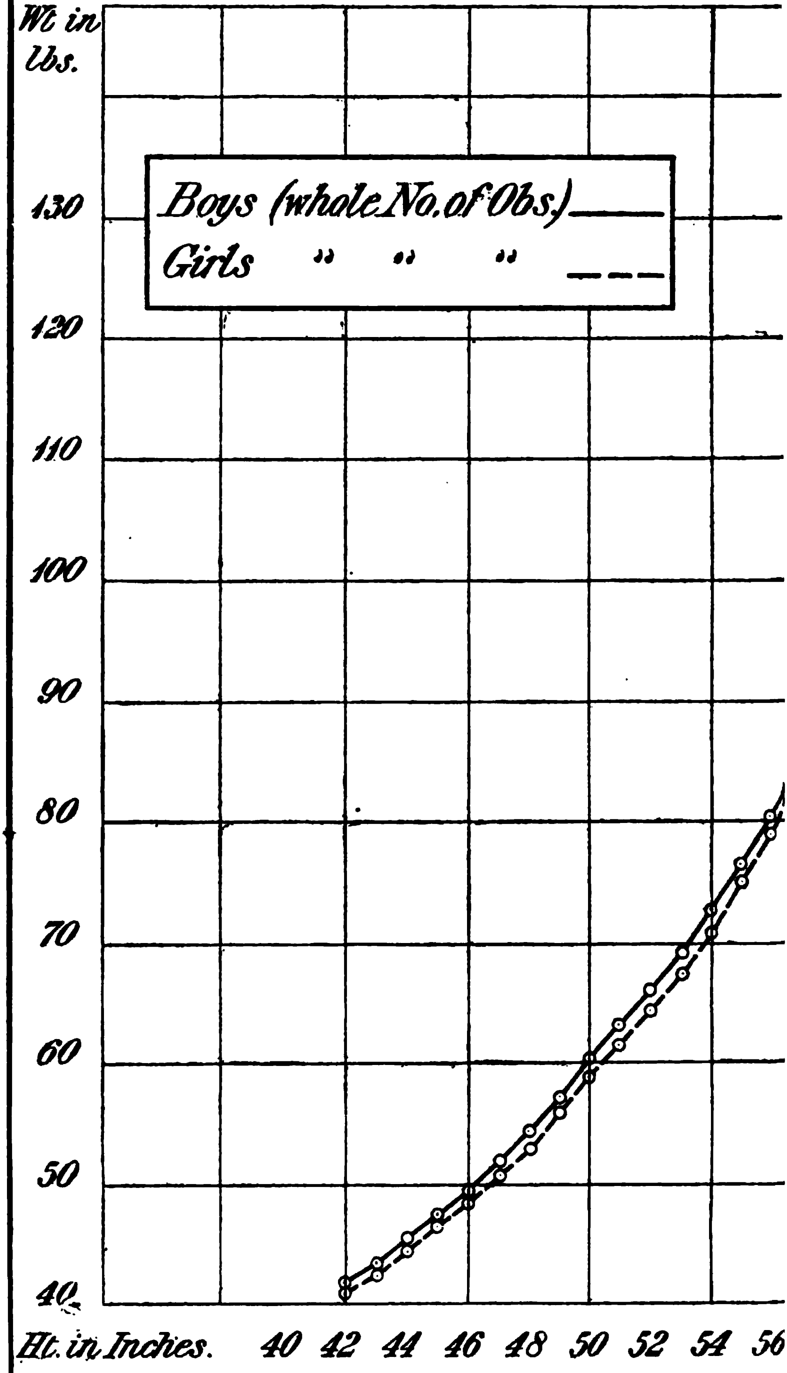
TABLE No. 23.

Showing Relation of Height to Weight in Growing Boys. (Weight given in Pounds.)

HEIGHT, Inches.	BOSTON SCHOOL BOYS.						ENGLISH BOYS.		Latin School, Technology Institute, etc.
	PARENTAGE.								
	American.	Irish.	American and Irish.	German.	One or both English.	Totals.	Laboring.	Non-laboring.	
42	41.63	42.07	41.68	41.90	41.40	41.77	46.50	-	-
43	43.29	43.87	43.63	43.38	43.59	43.60	49.18	-	-
44	44.98	45.76	45.64	45.49	45.60	45.63	50.58	-	-
45	47.00	47.69	47.68	48.41	47.24	47.58	51.71	-	-
46	49.03	49.83	49.72	50.64	49.25	49.65	53.55	-	-
47	51.45	52.34	51.76	52.67	51.97	52.07	55.63	53.77	-
48	54 03	54.84	54.05	55.64	54.60	54.57	58.35	57.12	-
49	56.81	57.48	56.52	58.59	57.49	57.31	61.10	59.23	-
50	59.69	60.31	59.75	61.09	60.32	60.20	63.82	61.34	-
51	62.82	63.29	63.32	63.41	63.24	63.23	66.79	63.53	-
52	65.95	66.28	66.47	66.30	65.71	66.27	69.52	65.74	60.10
53	69.11	69.27	69.35	69.42	67.85	69.20	72.70	68.86	67.03
54	72.33	72.77	72.30	73.45	71.82	72.73	76.46	73.50	72.24
55	76.55	76.41	75.28	77.41	75.94	76.44	81.70	76.36	75.86
56	80.66	80.19	78.82	81.16	80.98	80.24	87.22	79.21	81.44
57	84.12	84.00	82.67	84 93	85.44	84.04	91.41	81.86	86.58
58	87.58	87.85	86.65	88.63	88.48	87.86	94.68	84.51	89.55
59	91.34	91.69	90.73	92.32	91.52	91.58	97.95	89.16	92.70
60	95.20	96.20	-	97.26	95.26	95.51	101.35	94.84	95.55
61	98.94	100.50	-	102.10	99.25	100.54	105.10	99.22	98.41
62	105.06	104.71	-	107.23	105.41	105.63	108.99	103.23	102.79
63	111.03	108.56	-	-	113.24	110.71	112.88	107.25	108.75
64	115.97	112.52	-	-	-	115.86	118.84	110.90	114.71
65	120.84	-	-	-	-	121.01	126.47	114.65	120.90
66	126.70	-	-	-	-	126.61	139.50	122.66	126.94
67	-	-	-	-	-	136.09	146.55	132.88	133.64
68	-	-	-	-	-	-	-	144.37	-

who are above the average height will tend to raise the average weight for that age more than the weights of the children below the average height will tend to lower it, supposing the observations to be uniformly distributed on both sides of the average according to the binomial curve of Quetelet; consequently the average weight for a given age will be somewhat greater than the average weight of all the individuals, regardless of age, whose height is equal to the average height for that age. Notwithstanding these defects, the method has been adopted, first, because it is believed that the errors involved are so small as to be of no practical importance; and secondly, because relative rather than absolute values were sought, and a comparison between several sets of observations is not prevented by a small constant error running through them all.

Plate XII. *Showing relation of h*
children.



ght to weight in Boston school

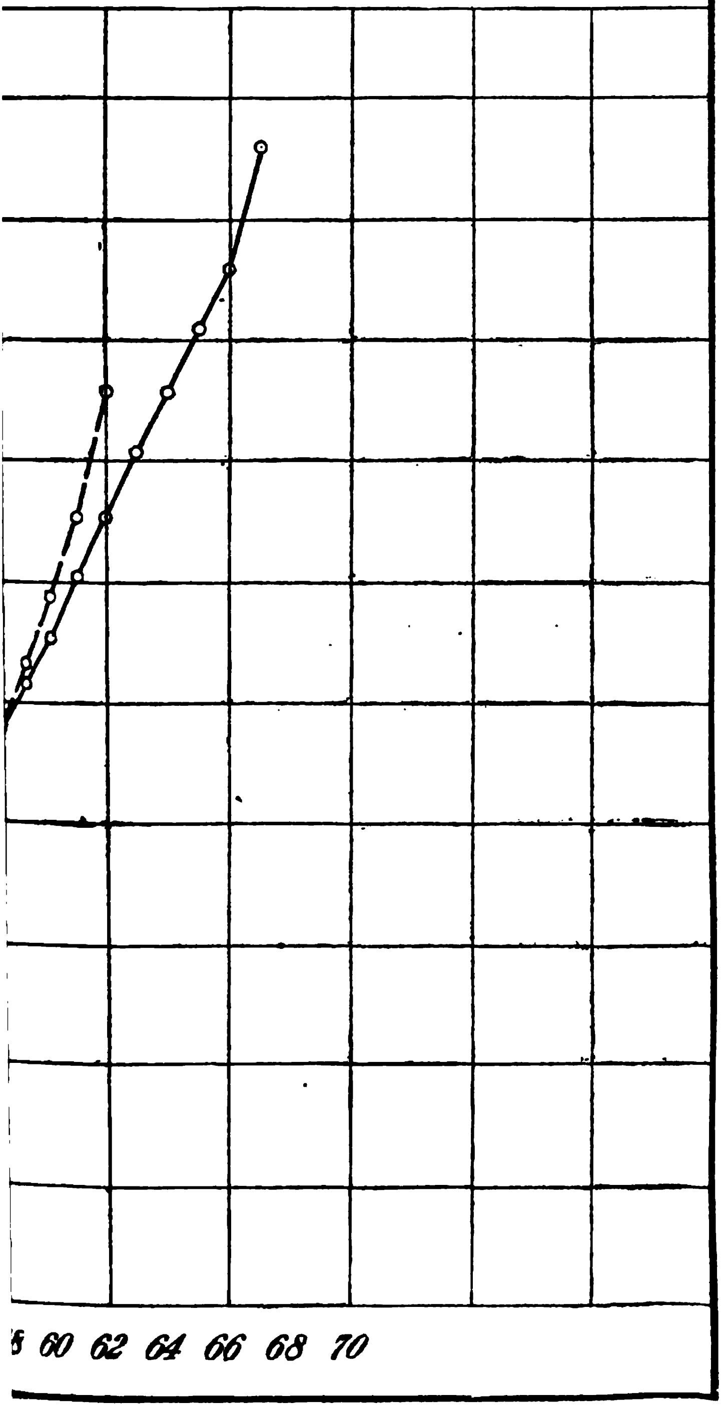


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TABLE No. 24.

Showing Relation of Height to Weight in Growing Girls. (Weight given in pounds.)

HEIGHT, inches.	BOSTON SCHOOL GIRLS.					
	PARENTAGE.					Totals.
	American.	Irish.	American and Irish.	German.	One or both English.	
42, ...	40.77	41.02	41.39	40.76	40.74	40.89
43, ...	42.61	42.70	42.77	42.50	42.79	42.62
44, ...	44.44	44.67	44.38	44.42	44.64	44.53
45, ...	46.25	46.71	46.08	46.43	46.67	46.45
46, ...	48.16	48.80	47.98	48.34	48.85	48.51
47, ...	50.47	50.96	50.23	50.29	51.02	50.71
48, ...	52.78	53.38	52.70	53.37	53.19	53.19
49, ...	55.68	56.01	55.30	56.69	55.25	56.06
50, ...	58.70	58.59	57.92	58.64	57.96	58.75
51, ...	62.02	61.10	60.71	60.83	61.04	61.39
52, ...	64.76	64.14	63.56	64.93	64 32	64.36
53, ...	67.85	67.39	66.51	69.09	67.66	67.54
54, ...	70.92	70.99	70.30	73.08	70.97	71.01
55, ...	74.14	74.65	74.89	76.90	74.33	74.90
56, ...	77.46	78.74	78.74	80.06	77.78	78.82
57, ...	80.79	82.97	82.71	83.18	82.81	83.38
58, ...	86.55	87.56	87.20	86.56	87.86	87.92
59, ...	92.64	92.86	94.60	93.32	92.80	93.29
60, ...	98.49	98.04	101.80	-	97.86	98.81
61, ...	105.44	107.83	109.04	-	106.14	105.39
62, ...	115.75	115.82	-	-	110.75	115.69

The following conclusions may be drawn from an examination of the tables :—

I. Growing boys are heavier in proportion to their height than growing girls until the height of 58 inches (147.9 c. m.) is reached. Above that point the reverse is the case. This is true in all the various sets of observations. The fact is rendered apparent by the curves on Plate XII., where the ordinates represent the weight in pounds corresponding to each inch of height, the values being calculated from the average dimensions of all the Boston school children measured, irrespective of the nationality of the parents. The height of 58 inches is attained in the 14th year, and it seems probable that the reversal in relative proportions of the two sexes may be connected with the accumulation of adipose tissue which occurs in girls at about the period of puberty.

II. The difference between children of American and those of foreign parents is constant in one direction for only in the case of boys of German parentage. T will be seen by the curves on Plate XIII., are u heavier in proportion to their height than the sons o can born parents.

III. The children of the laboring classes in Englar shown by the curves on Plate XIV., decidedly heavi portion to their height than those of the non-laborin This fact, taken in connection with the differences in height and weight of the same children (as show curve on Plate VIII.) seems to indicate that depri the comforts of life has a greater tendency to dim stature than the weight of a growing child.

IV. A comparison of the pupils of the selecte schools above mentioned with the children of the Eng laboring classes at the public schools and universitie that the former are in general heavier, in proportio height, than the latter (see Plate XV.). It seem fore, that the influences above alluded to (p. 297) w to a growing boy in this community a greater he weight than are attained by an English boy of the s affect the weight more powerfully than the height, the Boston boy is therefore by no means to be des tall and thin in comparison with his English cous Baxter's conclusion, "that the mean weight of t native of the United States is not disproportiona stature"* seems, therefore, as far as these boys are co as applicable to growing children as to adults.

It will thus be seen that the theory of the gradual degeneration of the Anglo-Saxon race in America d support from this investigation.†

DISTRIBUTION OF OBSERVATIONS.

Tables Nos. 4 to 15, inclusive, show the distributi observations on both height and weight. For instan Table No. 4, it will be seen that, of the 848 boys of f of age whose heights were measured, four (or 0.47 p of the whole number) were between 47 and 48 incl

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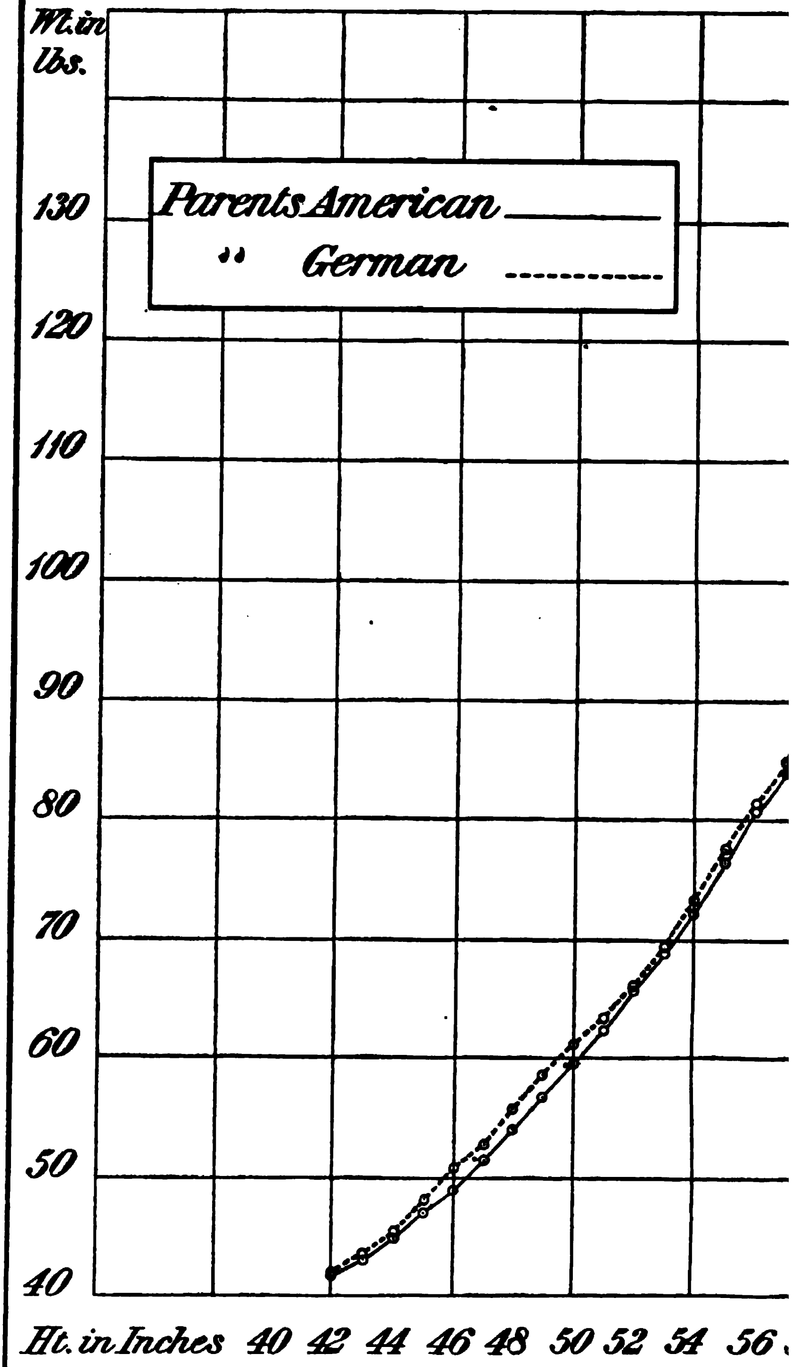
* Op. cit., p. 55.

† See an article on this subject by Rev. A. A. Livermore, in the Febru of the "Unitarian Review and Religious Magazine."

Plate XIII. *Showing relation o*

school boys.



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eight to weight in Boston

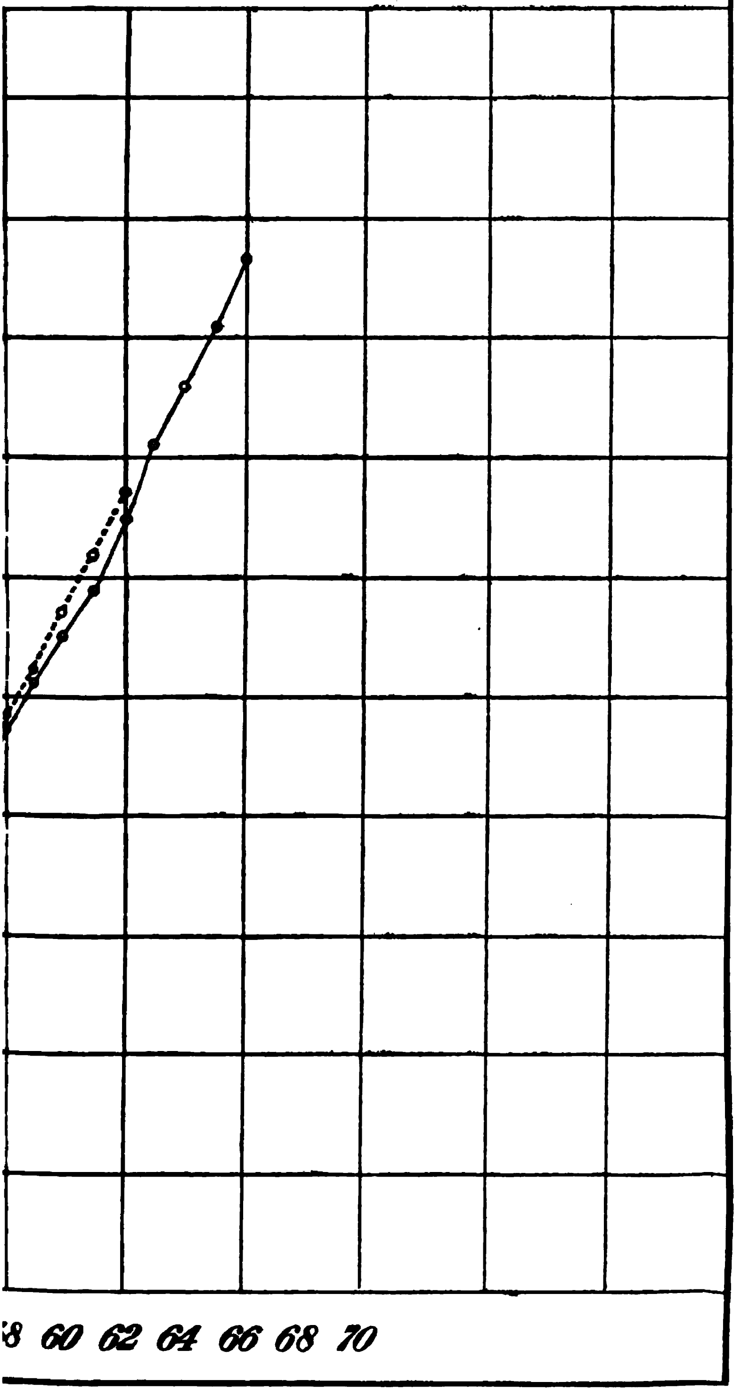
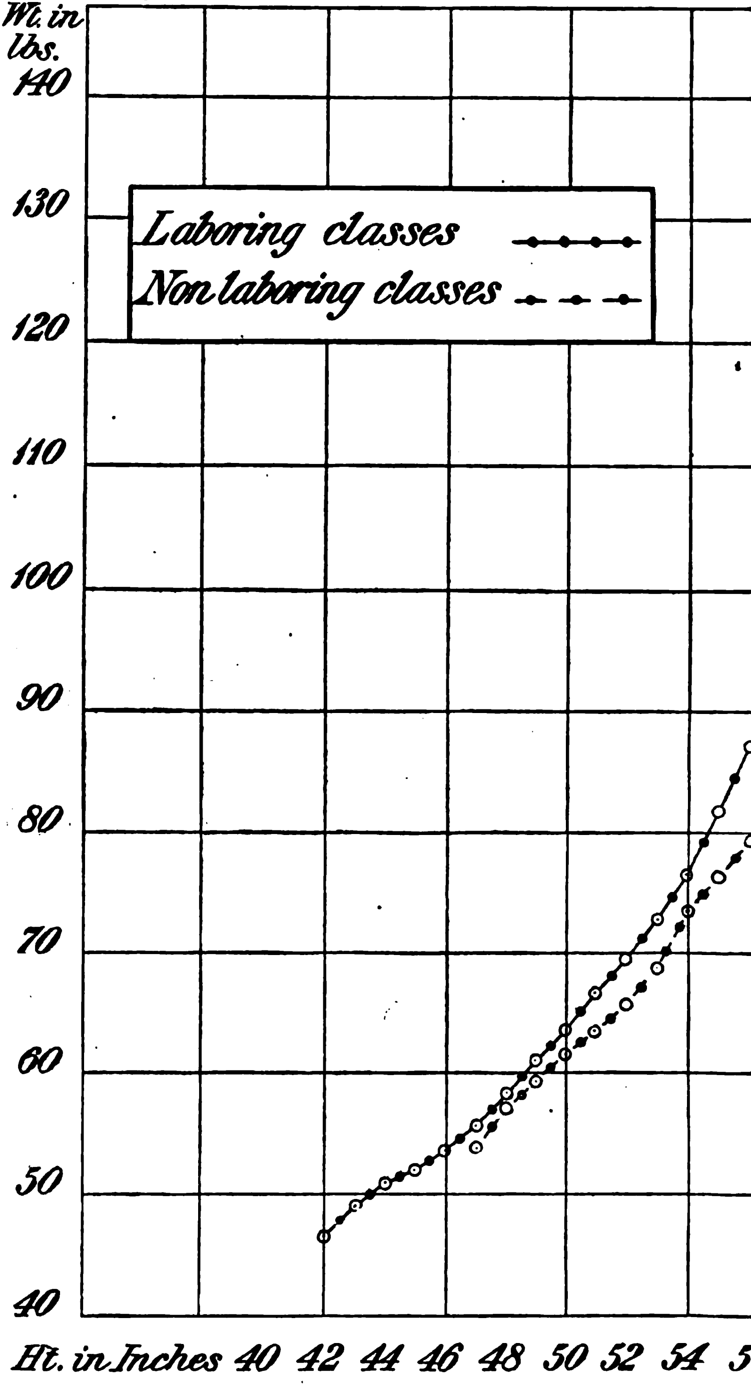


Plate XIV. *Showing relation o*

Boys.



height to weight in English

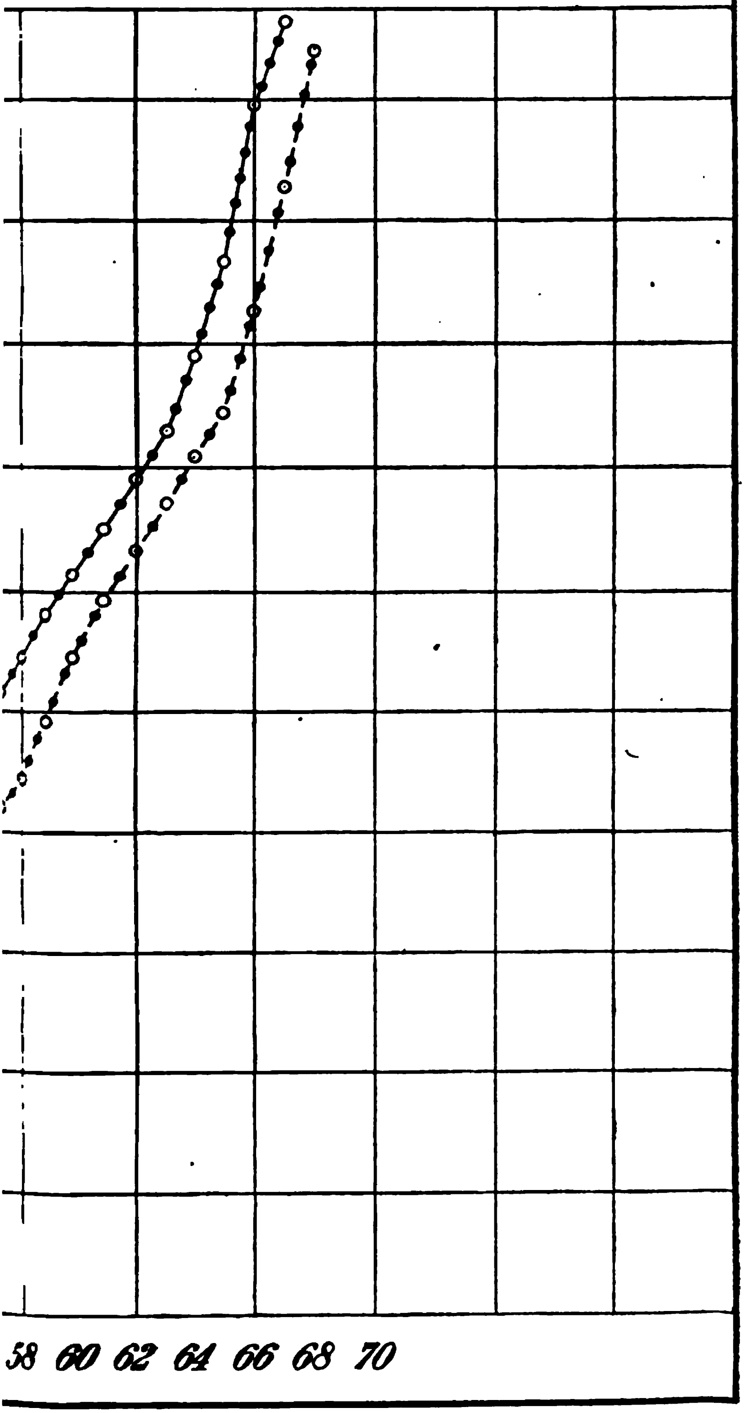
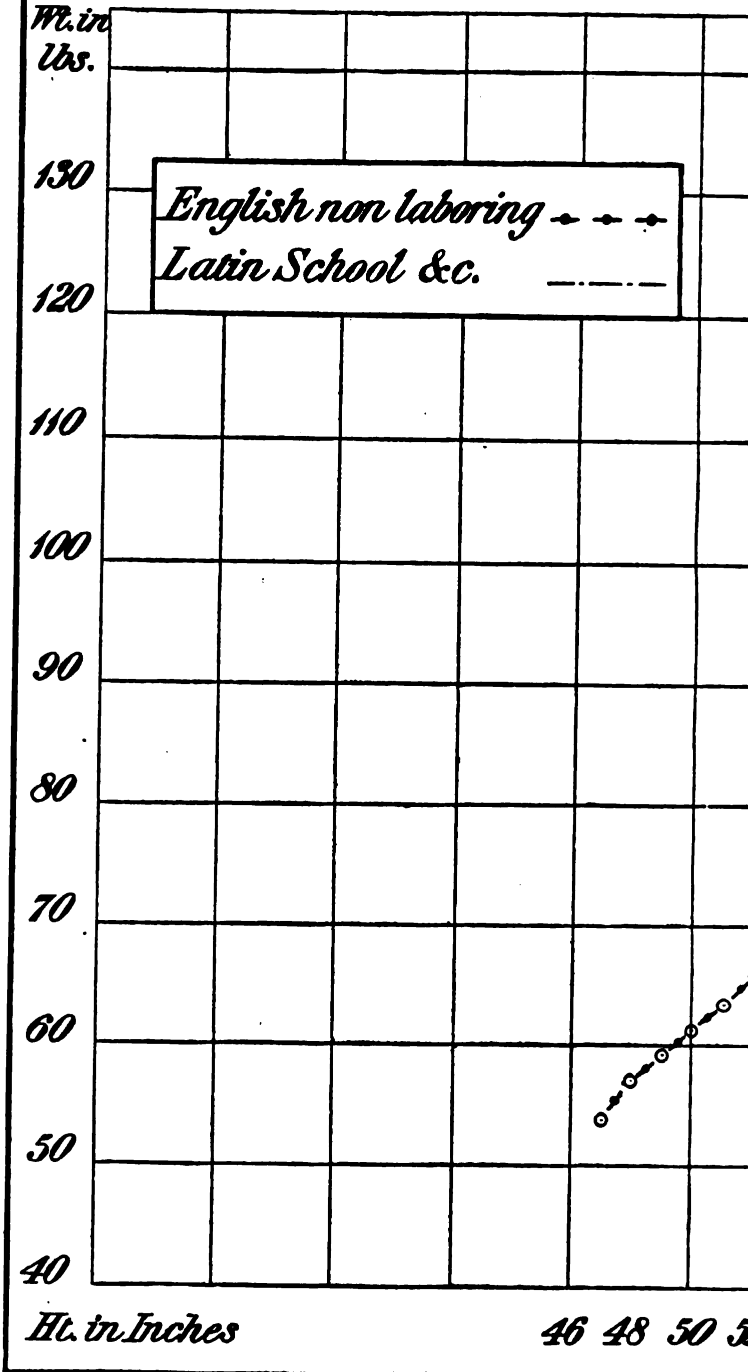
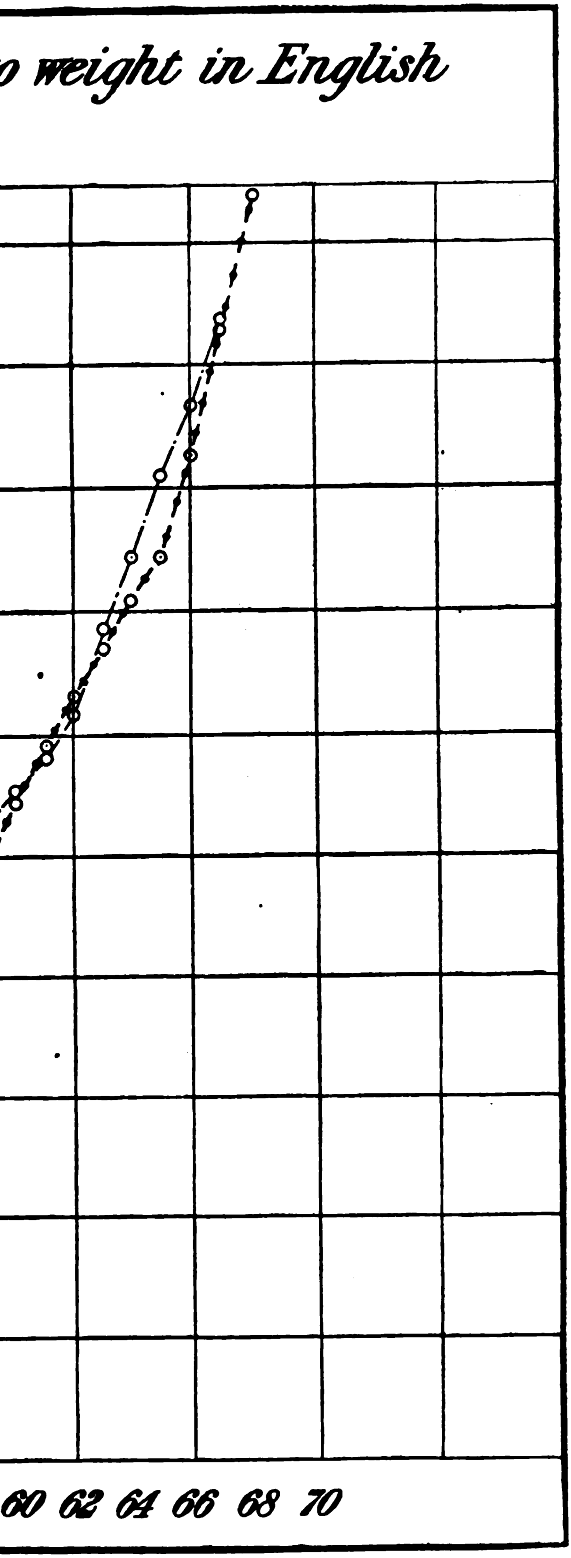


Plate XV. *Showing relation*
and American Boys.



A. N. HOUGHTON, 12 WEST ST. BOSTON.



o weight in English

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per cent. of the whole number) were between
hes high, etc. The distribution of observations
of the average height or weight may be repre-
ling to Quetelet, by the binomial curve. That
ividuals measured are sufficiently numerous, it
that the number of observations at each succes-
pound) will first increase and then diminish in
as the successive coefficients of $(a+b)^n$, as
Newton's binomial theorem. It will be noticed
s in the above-mentioned tables do not increase
with the regularity which a conformity with
nds; but it must be borne in mind that the
it each age are comparatively few in number,
e numerous measurements or a distribution of
servations in larger groups (*e. g.*, of two inches,
ounds each) would doubtless cause the appear-
er agreement with the law.

s (Nos. 4 to 15) show at a glance the range of
eight and weight at each age. It will be noticed
gradually increases with age (except where the
of observations is comparatively small), while
e of observations at the average height or
ule, diminishes. The most remarkable instances
om the normal dimensions are those of a boy five
but thirty inches in height; and of three girls,
years of age, weighing upwards of two hundred

WEIGHT OF CLOTHES.

oticed that in this investigation the weight of the
een given "in ordinary clothes," and no attempt
e to ascertain the net weight by making an allow-
lothing. This course was adopted because most
tions with which comparisons were to be made
en in this way; but in order to facilitate a com-
se records with others, in which a deduction is
weight of the clothes, an effort has been made to
average weight of the ordinary indoor clothing
different ages. For this purpose 317 pupils of
f various ages, and living in several different
e city, were requested by the principals of their

respective schools to ascertain and to report the weig
garments worn at the time the observations wer
From the data thus collected at various seasons of
the following table has been computed, showing in
columns, for each age, the number of observati

TABLE No. 25.

Showing Average Weight of Clothes Worn by School Ch

AGE AT LAST BIRTHDAY.	BOYS.				GIRLS.		
	No. of Observations.	AVERAGE WEIGHT IN POUNDS.		Percentage weight of clothes.	No. of Observations.	AVERAGE WEI IN POUNDS	
		Gross weight.	Clothes.			Gross weight.	
5, . . .	5	44.22	2.85	6.45	8	41.84	2.
6, . . .	14	43.51	3.13	7.19	9	43.90	2.
7, . . .	22	52.79	3.44	6.52	20	47.82	3.
8, . . .	13	56.15	4.06	7.23	21	53.69	3.
9, . . .	12	59.85	4.76	7.95	17	61.07	4.
10, . . .	9	63.25	5.72	9.04	20	66.45	4.
11, . . .	4	67.69	6.69	9.88	17	70.97	4.
12, . . .	11	78.29	7.27	9.29	15	82.96	5.
13, . . .	12	88.19	7.40	8.39	11	96.88	5.
14, . . .	17	99.22	8.09	8.15	14	111.47	7.
15, . . .	10	103.65	8.08	7.80	13	107.23	7.
16, . . .	7	120.30	9.67	7.86	8	117.16	8.
Total, . .	136	–	–	–	181	–	
Average for all ages, .	–	–	–	7.99	–	–	

average gross weight of the pupils, the average w
the clothes, and the percentage weight of the clothes
to the gross weight of the individual. From this tab
be seen that, except in the case of very young childr
the absolute and the percentage weight of the cloth
any given age, greater for boys than for girls. The
weight of the clothes for all ages is, for boys, 8 per c
for girls, 6.8 per cent., of the gross weight.

This estimate is considerably larger than that
Quetelet,* whose allowance for clothing is, for boys,

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* Sur l'Homme, II. p. 44.

ınd for girls, $\frac{1}{24}$ (4.17 per cent.), of the gross is difference is, perhaps, to be in part accounted fact that the pupils whose clothes were weighed ly rather better clothed than the average children age; for it was, of course, impossible to obtain, od adopted, any data from the poorest classes of on, owing to their lack of an intelligent interest r.

Summary of Results.

important results of the foregoing investigation nerated as follows:—

rowth of children takes place in such a way that ;e of eleven or twelve years, boys are both taller than girls of the same age. At this period of life to grow very rapidly, and for the next two or surpass boys of the same age in both height and ys then acquire and retain a size superior to that have now nearly completed their full growth. nt is based upon observations on several different various conditions of life.

lren of American-born parents are, in this comer and heavier than children of foreign-born uperiority which seems to depend partly on the ige comfort in which such children live and grow ly upon differences of race or stock.

ils of American parentage at the public Latin ate Latin School, and Massachusetts Institute of are (apparently for similar reasons) superior in weight to the generality of boys of American tending the public schools.

ils of the same selected schools are also taller than English boys of the non-laboring classes ıblic schools and universities, the superiority in ;, as a rule, more marked than that in height.

relation of weight to height in growing children at heights below 58 inches, boys are heavier than portion to their stature. At heights above 58 verse is the case.

CONCLUSION.

Both the number and the value of the conclusions arrived at in this investigation are diminished by the lack of similar collections of statistics in other communities with which a comparison may be made. This being the case, the following brief enumeration of the points to which the attention of the collector of vital statistics may profitably be directed, will, perhaps, not be considered out of place :—

I. *The influence of geographical and climatic conditions on the size of growing children.*—It has been shown by the researches of Dr. Gould and Dr. Baxter, that the size of adult native Americans is very different in different States of the Union, and even in different parts of the same State. It would be interesting to determine by observations on children how early in life this difference becomes apparent.

II. *The number of generations necessary for the complete development of the influence of changed climatic conditions on the rate of grówth of a given race.*—It has already been shown (see p. 299) that this influence apparently begins to be felt in the first generation, and it would be of interest to trace the accumulating effect through successive generations by means of inquiries as to the ancestry of the individuals measured. This could most readily be accomplished in those Western communities which consist almost exclusively of emigrants (and their descendants) from some limited region of the Old World.

III. *The effect (if any exists) of the season of the year on the rate of growth.*—This would be readily ascertained by successive spring and autumn observations on growing children; and it is in recording measurements of this sort that fathers of families and all others having charge of children have it in their power to contribute most efficiently to the solution of anthropometrical and ethnological questions.

IV. *The comparative effect of city and of country life on the rate of growth.*—In investigating this subject, the effect of climatic influences must be eliminated by restricting the comparison to cities and the *adjacent* country, and regard must be paid to the race or stock and to the social condition of the individuals selected for comparison.

V. *The relation between diseases and the rate of growth.*—For example, it would be interesting to inquire whether, in the rapid growth which is said to follow certain diseases, especially fevers, the height and weight increase in their normal ratio; whether this accelerated growth *after* the disease is simply a compensation for a retardation *during* the disease; whether abnormally rapid growth causes a predisposition to disease, and whether any connection can be traced between the rate of growth and the frequency with which certain diseases of growing children (*e. g.*, chorea) occur at different ages.

VI. *The effect of local hygienic conditions on the physique of growing children.*—Since comfort and misery appear to have such a direct effect upon the size of growing children, it seems not improbable that a systematic comparative study of the physique of the growing population in different localities will throw light upon the relative sanitary conditions there prevalent.

It will thus be seen that a wide field is open for statistical research, in which nearly every one can do good work. The collection of physical data in regard to the human body has been, in the past, left almost exclusively in the hands of artists, who have sought to establish, as guides for their work, simple proportions between the various dimensions of the body, and of military statisticians, who have looked upon the human frame simply as a machine for performing a soldier's work, and have necessarily confined their observations to adult males. It is to be hoped that in the future the hygienist and the educator will recognize, in the physical measurements of growing children, a guide for the application of their sanitary regulations and a test for the efficiency of their systems of physical training.

APPENDIX.

By the kindness of President Runkle of the Massachusetts Institute of Technology, the writer is enabled to present formulas which express the relation between the weight and height of growing children, from five to eighteen years of age, with considerable accuracy.*

The figures of Tables Nos. 23 and 24, showing the weights corresponding to each inch of height in the whole number of observations were placed by President Runkle in the hands of Professor Gaetano Lanza, who kindly subjected them to a mathematical discussion, and reported on the subject substantially as follows:—

The results of Dr. Bowditch's observations on the relation between the weight and height of boys from 42 to 66 inches inclusive, are very fairly represented by the following empirical equation:—

Let $y =$ weight in lbs., and $x =$ height in inches; then

$$\log. y = 0.02007x + 0.77724, \text{ or } y = 10^{0.02007x + 0.77724}. \qquad \text{(A)}$$

The results of the observations on the relation between the weight and height of girls from 42 to 61 inches inclusive, are represented with tolerable accuracy by the following empirical equation:—

Let $y =$ weight in lbs., and $x =$ height in inches; then

$$\log. y = 0.02164x + 0.69017, \text{ or } y = 10^{0.02164x + 0.69017}. \qquad \text{(B)}$$

The greatest difference between calculated and observed values is, in the case of boys, 0.65 lb., and in that of girls, 1.41 lbs., with one exception, where it is 3.01 lbs.

The equations

$$y = 0.002428x^{2.59} \qquad (\text{A}^1)$$

for the boys, and

$$y = 0.001277x^{2.75} \qquad (\text{B}^1)$$

for the girls, represent quite roughly the results.

The following table, embodying the results of Professor Lanza's discussion, shows at a glance the superior accuracy of the logarithmic equations (A) and (B), as compared with the exponential equations (A^1) and (B^1).

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* For older as well as for younger children, the formulas are obviously much less accurate.

TABLE No. 26.

Showing the agreement between the observed weights corresponding to each inch of height, and those calculated by the equations A, A¹, B, and B¹.

HEIGHT, in Inches.	BOYS—WEIGHT IN POUNDS.					GIRLS—WEIGHT IN POUNDS.				
		CALCULATED.					CALCULATED.			
	Observed.	By (A).	Correction.	By (A¹).	Correction.	Observed.	By (B).	Correction.	By (B¹).	Correction.
42, .	41.77	41.71	+0.06	38.84	+2.93	40.89	39.72	+1.17	37.16	+3.73
43, .	43.60	43.68	—0.08	41.28	+2.32	42.62	41.75	+0.87	39.65	+2.97
44, .	45.63	45.74	—0.11	43.82	+1.81	44.53	43.89	+0.64	42.23	+2.30
45, .	47.58	47.91	—0.33	46.44	+1.11	46.45	46.13	+0.32	44.92	+1.53
46, .	49.65	50.17	—0.52	49.16	+0.49	48.51	48.49	+0.02	47.72	+0.79
47, .	52.07	52.55	—0.48	51.98	+0.09	50.71	50.96	—0.25	50.63	+0.08
48, .	54.57	55.03	—0.46	54.89	—0.32	53.19	53.57	—0.38	53.65	—0.46
49, .	57.31	57.63	—0.32	57.90	—0.59	56.06	56.30	—0.24	56.78	—0.71
50, .	60.20	60.35	—0.15	61.01	—0.81	58.75	59.18	—0.43	60.02	—1.27
51, .	63.23	63.21	+0.02	64.22	—0.99	61.39	62.20	—0.81	63.38	—1.99
52, .	66.27	66.20	+0.07	67.53	—1.26	64.36	65.38	—1.02	66.86	—2.50
53, .	69.20	69.34	—0.14	70.95	—1.75	67.54	68.72	—1.18	70.46	—2.92
54, .	72.73	72.61	+0.12	74.47	—1.74	71.01	72.23	—1.22	74.17	—3.16
55, .	76.44	76.05	+0.39	78.09	—1.65	74.90	75.92	—1.02	78.01	—3.11
56, .	80.24	79.65	+0.59	81.83	—1.59	78.82	79.80	—0.98	81.97	—3.15
57, .	84.04	83.41	+0.63	85.66	—1.22	83.38	83.88	—0.50	86.06	—2.68
58, .	87.86	87.36	+0.50	89.61	—1.75	87.92	88.16	—0.24	90.28	—2.56
59, .	91.58	91.48	+0.10	93.67	—2.09	93.29	92.67	+0.62	94.62	—1.33
60, .	95.51	95.82	—0.31	97.83	—2.32	98.81	97.40	+1.41	99.10	—0.29
61, .	100.54	100.35	+0.19	102.11	—1.57	105.39	102.38	+3.01	103.70	+1.69
62, .	105.63	105.09	+0.54	106.50	—0.87	-	-	-	-	-
63, .	110.71	110.06	+0.65	111.01	—0.30	-	-	-	-	-
64, .	115.86	115.27	+0.59	115.63	+0.23	-	-	-	-	-
65, .	121.01	120.72	+0.29	120.37	+0.64	-	-	-	-	-
66, .	126.61	126.43	+0.18	125.23	+1.38	-	-	-	-	-

TABLE No. 1.—*Showing Average Heights and Weights of Boston School Boys.*

AVERAGE HEIGHTS (without shoes).

AGE AT LAST BIRTHDAY.	PARENTAGE.								
	AMERICAN.			IRISH.			AMERICAN AND IRISH.		
	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.
Five, . .	201	41.74	106.0	366	41.59	105.5	42	42.16	107.1
Six, . . .	342	44.10	112.0	503	43.74	111.1	65	43.56	110.7
Seven, . .	369	46.21	117.4	562	45.61	115.8	77	45.68	116.1
Eight, . .	407	48.16	122.3	588	47.72	121.2	66	47.53	120.7
Nine, . .	381	50.09	127.2	556	49.53	125.2	67	49.30	125.2
Ten, . . .	360	52.21	132.6	571	51.57	131.1	56	51.35	130.4
Eleven, . .	350	54.01	137.2	548	53.10	134.9	55	53.33	135.4
Twelve, . .	373	55.78	141.7	497	54.82	139.3	53	55.13	140.0
Thirteen, . .	391	58.17	147.7	463	56.70	144.0	45	56.69	143.9
Fourteen, . .	386	61.08	155.1	334	58.88	149.5	22	59.28	150.5
Fifteen, . .	342	62.96	159.9	155	61.15	155.3	16	61.93	157.3
Sixteen, . .	232	65.58	166.5	61	64.09	162.8	6		
Seventeen, .	128	66.29	168.4	26	66.20	168.2			
Eighteen, . .	65	66.76	169.5	5					
Totals, . .	4,327			5,235			570		

PARENTAGE.

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AGE AT LAST BIRTHDAY.	German. No. of Obs.	German. Inches.	German. Centimeters.	One or Both English. No. of Obs.	One or Both English. Inches.	One or Both English. Centimeters.	Totals. No. of Obs	Totals. Inches.	Totals. Centimeters.
Five, . .	48	41.08	104.3	75	41.40	105.2	848	41.57	105.6
Six, . . .	71	43.50	110.5	99	43.64	110.9	1,258	43.75	111.1
Seven, . .	87	45.25	114.1	113	45.60	115.8	1,419	45.74	116.2
Eight, . .	84	47.13	119.7	136	47.50	120.7	1,481	47.76	121.3
Nine, . .	87	48.85	124.1	130	49.39	125.4	1,437	49.69	126.2
Ten, . . .	75	51.21	130.1	105	51.62	131.2	1,363	51.68	131.3
Eleven, . .	91	52.92	134.4	93	52.81	134.1	1,293	53.33	135.4
Twelve, . .	76	54.55	138.6	101	54.89	139.4	1,253	55.11	140.0
Thirteen, . .	53	56.70	144.0	84	56.76	144.2	1,160	57.21	145.3
Fourteen, . .	38	59.14	151.2	47	59.40	150.9	908	59.88	152.1
Fifteen, . .	26	62.06	157.6	51	61.48	156.2	636	62.30	158.2
Sixteen, . .	7	64.75	164.4	27	63.88	162.2	359	65.00	165.1
Seventeen, .	7						192	66.16	168.0
Eighteen, . .	2						84	66.66	169.3
Totals, . .	752			1,061			13,691		

TABLE No. 1 (Continued).—*Showing Average Heights and Weights of Boston School Boys.*

AVERAGE WEIGHTS (in ordinary dress).

AGE AT LAST BIRTHDAY.	PARENTAGE.								
	AMERICAN.			IRISH.			AMERICAN AND IRISH.		
	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.
Five, . .	201	41.20	18.71	366	41.33	18.75	42	41.99	19.05
Six, . . .	342	45.14	20.48	503	45.25	20.52	65	44.73	20.29
Seven, . .	369	49.47	22.44	562	48.90	22.19	77	49.08	22.26
Eight, . .	407	54.43	24.70	588	54.12	24.55	66	52.86	23.97
Nine, . .	381	59.97	26.58	556	58.92	26.73	67	57.27	25.97
Ten, . . .	360	66.62	30.22	571	64.99	29.48	56	64.57	29.29
Eleven, . .	350	72.39	32.83	548	69.60	31.56	55	70.34	31.91
Twelve, . .	373	79.82	36.21	497	75.70	34.34	53	75.66	34.32
Thirteen, . .	391	88.26	40.04	463	82.84	37.58	45	81.42	36.93
Fourteen, . .	386	99.28	45.03	334	91.19	41.36	22	91.89	41.68
Fifteen, . .	342	110.84	50.26	155	101.21	45.90	16	107.91	48.96
Sixteen, . .	232	123.67	56.09	61	112.88	51.19	6		
Seventeen, .	128	128.72	58.40	26	127.40	57.80			
Eighteen, . .	65	132.71	60.20	5					
Totals, . .	4,327			5,235			570		

ary dress).

AGE AT LAST BIRTHDAY.	PARENTAGE.								
	German.			One or Both English.			Totals.		
	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.
Five, . .	48	40.57	18.39	75	40.07	18.18	848	41.09	18.64
Six, . . .	71	44.09	20.01	99	45.03	20.43	1,258	45.17	20.49
Seven, . .	87	49.12	22.29	113	48.20	21.86	1,419	49.07	22.26
Eight, . .	84	52.94	24.02	136	53.21	24.14	1,481	53.92	24.46
Nine, . .	87	58.25	26.43	130	58.57	26.58	1,437	59.23	26.87
Ten, . . .	75	63.93	29.00	105	65.06	29.51	1,363	65.30	29.62
Eleven, . .	91	69.09	31.34	93	67.11	30.44	1,293	70.18	31.84
Twelve, . .	76	75.70	34.34	101	75.39	34.20	1,253	76.92	34.89
Thirteen, . .	53	83.85	38.04	84	84.72	38.44	1,160	84.84	38.49
Fourteen, . .	38	92.87	42.12	47	92.72	42.07	908	94.91	42.95
Fifteen, . .	26	107.53	48.80	51	101.21	45.90	636	107.10	48.59
Sixteen, . .	7	123.67	56.09	27	120.32	54.57	359	121.01	54.90
Seventeen, .	7						192	127.49	57.84
Eighteen, . .	2						84	132.55	60.13
Totals, . .	752			1,061			13,691		

TABLE NO. 2.—*Showing Average Heights and Weights of Boston School Girls.*

AVERAGE HEIGHTS (without shoes).

AGE AT LAST BIRTHDAY.	PARENTAGE.								
	AMERICAN.			IRISH.			AMERICAN AND IRISH.		
	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.
Five, . .	127	41.47	105.3	236	41.18	104.6	29	41.42	105.2
Six, . . .	236	43.66	110.9	395	43.29	109.9	43	43.18	109.6
Seven, . .	346	45.94	116.7	426	45.45	115.4	53	45.69	116.0
Eight, . .	338	48.07	122.1	486	47.39	120.4	59	47.40	120.4
Nine, . .	323	49.61	126.0	416	49.27	125.2	48	48.77	123.9
Ten, . . .	336	51.78	131.5	379	51.20	130.1	51	51.17	129.9
Eleven, . .	290	53.79	136.6	340	53.13	134.9	36	53.51	135.9
Twelve, . .	309	57.16	145.2	307	55.41	140.8	28	54.91	139.5
Thirteen, . .	307	58.75	149.2	278	57.64	146.3	28	57.81	146.8
Fourteen, . .	290	60.32	153.2	192	59.67	151.5	23	59.44	151.0
Fifteen, . .	255	61.39	155.9	95	60.47	153.5	11	61.07	155.0
Sixteen, . .	238	61.72	156.7	49	61.05	155.1	9		
Seventeen, .	168	61.99	157.4	18	62.00	157.5			
Eighteen, . .	118	62.01	157.5	6					
Totals, . .	3,681			3,623			418		

PARENTAGE.

AGE AT LAST BIRTHDAY.	German.			One or Both English.			Totals.		
	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.	No. of Obs.	Inches.	Centimeters.
Five, . .	50	41.40	105.1	75	41.14	104.5	605	41.29	104.9
Six, . . .	66	43.09	109.4	98	43.32	110.0	987	43.35	110.1
Seven, . .	82	44.91	114.0	104	44.81	113.8	1,199	45.52	115.6
Eight, . .	75	47.15	119.7	117	47.63	121.0	1,299	47.58	120.9
Nine, . .	76	49.20	125.0	96	49.37	125.4	1,149	49.37	125.4
Ten,. . .	57	50.76	128.9	112	50.98	129.5	1,089	51.34	130.4
Eleven, . .	57	52.62	133.9	88	53.63	136.2	936	53.42	135.7
Twelve, . .	53	54.73	139.0	89	55.89	141.9	935	55.88	141.9
Thirteen, . .	31	57.82	146.8	69	57.71	146.6	830	58.16	147.7
Fourteen, . .	23	58.55	148.7	56	60.15	152.8	675	59.94	152.3
Fifteen, . .	10	59.81	151.9	48	60.93	154.7	459	61.10	155·2
Sixteen, . .	4			27	62.17	157.9	353	61.59	156.4
Seventeen, .	1						233	61.92	157.2
Eighteen, . .							155	61.95	157.3
Totals, . .	585			979			10,904		

TABLE NO. 2 (Continued).—*Showing Average Heights and Weights of Boston School Girls.*

AVERAGE WEIGHTS (in ordinary dress).

AGE AT LAST BIRTHDAY.	PARENTAGE.								
	AMERICAN.			IRISH.			AMERICAN AND IRISH.		
	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.
Five, . .	127	39.82	18.06	236	39.63	17.97	29	40.59	18.42
Six, . . .	236	43.81	19.87	395	43.21	19.60	43	43.02	19.52
Seven, . .	346	48.02	21.78	426	47.64	21.61	53	47.28	21.44
Eight, . .	338	52.93	24.01	486	51.80	23.50	59	51.17	23.21
Nine, . .	323	57.52	26.10	416	56.76	25.75	48	54.66	24.79
Ten, . . .	336	64.09	29.07	379	61.59	27.94	51	61.17	27.69
Eleven, . .	290	70.26	31.87	340	67.83	30.77	36	68.02	30.85
Twelve, . .	309	81.35	36.90	307	76.15	34.55	28	74.55	33.82
Thirteen, . .	307	91.18	41.36	278	85.76	38.91	28	85.89	38.97
Fourteen, . .	290	100.32	45.50	192	96.36	43.71	23	97.83	44.37
Fifteen, . .	255	108.42	49.17	95	100.46	45.56	11	109.51	
Sixteen, . .	238	112.97	51.24	49	108.56	49.24	9		49.68
Seventeen, .	168	115.84	52.54	18	115.82	52.49			
Eighteen, . .	118	115.80	52.52	6					
Totals, . .	3,681			3,623			418		

TABLE No. 2 (Concluded).—*Showing Average Heights and Weights of Boston School Girls.*

AVERAGE WEIGHTS (in ordinary dress).

AGE AT LAST BIRTHDAY.	PARENTAGE.								
	GERMAN.			ONE OR BOTH ENGLISH.			TOTALS.		
	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.	No. of Obs.	Pounds.	Kilograms.
Five, . .	50	39.73	18.02	75	39.05	17.72	605	39.66	17.99
Six, . . .	66	42.68	19.36	98	43.26	19.62	987	43.28	19.63
Seven, . .	82	46.26	20.98	104	46.26	20.99	1,199	47.46	27.10
Eight, . .	75	50.60	22.96	117	52.45	23.79	1,299	52.04	23.44
Nine, . .	76	57.37	26.02	96	55.96	25.40	1,149	57.07	25.91
Ten, . . .	57	59.83	27.14	112	60.98	27.66	1,089	62.35	28.29
Eleven, . .	57	67.56	30.65	88	69.78	31.65	936	68.84	31.23
Twelve, . .	53	76.06	34.50	89	77.24	35.03	935	78.31	35.53
Thirteen, . .	31	85.82	38.93	69	86.38	39.20	830	88.65	40.21
Fourteen, . .	23	88.91	40.33	56	98.73	44.78	675	98.43	44.65
Fifteen, . .	10	101.16	45.87	48	105.53	47.88	459	106.08	48.12
Sixteen, . .	4			27	111.94	50.76	353	112.03	50.81
Seventeen, .	1						233	115.53	52.41
Eighteen, . .							155	115.16	52.24
Totals, . .	585			979			10,904		

TABLE No. 3.—*Showing Annual Growth and Ratio of Weight to Height of Boston School Children.*

BOYS.

AGE.*	PARENTAGE.								
	AMERICAN.			IRISH.			AMERICAN AND IRISH.		
	Annual Increase.		Pounds per inch.	Annual Increase.		Pounds per inch.	Annual Increase.		Pounds per inch.
	Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.	
Five, . .			.987			.993			.996
Six, . . .	2.36	3.94	1.023	2.15	3.92	1.034	1.40	2.74	1.027
Seven, . .	2.11	4.33	1.070	1.87	3.65	1.072	2.12	4.35	1.074
Eight, . .	1.95	4.96	1.130	2.11	5.22	1.134	1.85	3.78	1.112
Nine, . .	1.93	5.54	1.197	1.81	4.80	1.189	1.77	4.41	1.161
Ten, . . .	2.12	6.65	1.276	2.04	6.07	1.260	2.05	7.30	1.257
Eleven, . .	1.80	5.77	1.340	1.53	4.61	1.310	1.98	5.77	1.319
Twelve, . .	1.77	7.43	1.431	1.72	6.10	1.381	1.80	5.32	1.372
Thirteen, . .	2.39	8.44	1.517	1.88	7.14	1.461	1.56	5.76	1.436
Fourteen, . .	2.91	11.02	1.625	2.18	8.35	1.548	2.59	10.47	1.550
Fifteen, . .	1.88	11.56	1.760	2.27	10.02	1.655			1.742
Sixteen, . .	2.62	12.83	1.885	2.94	11.67	1.761			
Seventeen, .	.71	5.05	1.941			1.924			
Eighteen, . .	.47	3.99	1.988						

PARENTAGE.

AGE.*	GERMAN.			ONE OR BOTH ENGLISH.			TOTALS.		
	Annual Increase.		Pounds per inch.	Annual Increase.		Pounds per inch.	Annual Increase.		Pounds per inch.
	Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.	
Five, . .			.987			.967			.988
Six, . . .	2.42	3.52	1.013	2.24	4.96	1.031	2.18	4.08	1.032
Seven, . .	1.75	5.03	1.085	1.96	3.17	1.057	1.99	3.90	1.072
Eight, . .	1.88	3.82	1.123	1.90	5.01	1.119	2.02	4.85	1.129
Nine, . .	1.72	5.31	1.192	1.89	5.36	1.185	1.93	5.31	1.191
Ten, . . .	2.36	5.68	1.248	2.23	6.49	1.260	1.99	6.07	1.263
Eleven, . .	1.71	5.16	1.305	1.19	2.05	1.270	1.65	4.88	1.315
Twelve, . .	1.63	6.61	1.388	2.08	8.28	1.373	1.78	6.74	1.395
Thirteen, . .	2.15	8.15	1.477	1.87	9.33	1.492	2.10	7.92	1.482
Fourteen, . .	2.44	9.02	1.570	2.64	8.00	1.561	2.67	10.07	1.585
Fifteen, . .	2.92	14.66	1.732	2.08	8.49	1.646	2.42	12.19	1.719
Sixteen, . .			1.952	2.40	19.11	1.883	2.70	13.91	1.861
Seventeen, .							1.16	6.48	1.927
Eighteen, . .							.50	5.06	1.988

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* See foot-note, p. 281.

TABLE No. 8 (Continued).—*Showing Annual Growth and Ratio of Weight to Height of Boston School Children.*

GIRLS.

AGE.*	PARENTAGE.								
	AMERICAN.			IRISH.			AMERICAN AND IRISH.		
	Annual Increase.		Pounds per inch.	Annual Increase.		Pounds per inch.	Annual Increase.		Pounds per inch.
	Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.	
Five,			.960			.962			.980
Six,	2.19	3.99	1.003	2.11	3.58	.998	1.76	2.43	.996
Seven,	2.28	4.21	1.045	2.16	4.43	1.048	2.51	4.26	1.034
Eight,	2.13	4.91	1.101	1.94	4.16	1.093	1.71	3.89	1.079
Nine,	1.54	4.59	1.159	1.88	4.96	1.152	1.37	3.49	1.120
Ten,	2.17	6.57	1.237	1.93	4.83	1.203	2.40	6.51	1.195
Eleven,	2.01	6.17	1.306	1.93	6.24	1.276	2.34	6.85	1.271
Twelve,	3.37	11.09	1.423	2.28	8.32	1.374	1.40	6.53	1.357
Thirteen,	1.59	9.83	1.552	2.23	9.61	1.487	2.90	11.34	1.486
Fourteen,	1.57	9.14	1.663	2.03	10.60	1.614	1.63	11.94	1.645
Fifteen,	1.07	8.10	1.766	.80	4.10	1.661			1.793
Sixteen,	.33	4.55	1.830	.58	8.10	1.778			

13.—*Showing Weights of Boston School Girls. Whole Number of Observations*

	AGE AT LAST BIRTHDAY.									
	9 Yrs.		10 Yrs.		11 Yrs.		12 Yrs.		13 Yrs.	
nt.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	1	.11	1	.12
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	1	.12
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	1	.11	1	.12
	–	–	–	–	–	–	1	.11	1	.12
	–	–	–	–	–	–	3	.32	5	.60
	–	–	–	–	–	–	3	.32	4	.48
	–	–	–	–	1	.09	3	.32	13	1.57
	–	–	–	–	1	.09	6	.64	24	2.89
	–	–	–	–	2	.21	10	1.07	20	2.41
	1	.08	1	.09	4	.43	5	.53	34	4.09
	1	.08	3	.27	5	.53	17	1.82	64	7.71
	–	–	1	.09	6	.64	18	1.92	54	6.51
	2	.17	2	.18	4	.43	31	3.32	70	8.43
7	–	–	5	.46	18	1.92	53	5.66	79	9.52
	1	.08	11	1.01	32	3.42	79	8.45	89	10.71
	5	.43	9	.83	36	3.85	101	10.80	73	8.79
	3	.26	20	1.84	56	5.98	112	11.97	72	8.67
1	8	.69	45	4.13	95	10.14	102	10.91	83	10.00
4	36	3.13	83	7.62	130	13.89	129	13.79	65	7.83
0	52	4.52	156	14.32	131	14.00	109	11.65	34	4.09
2	141	12.27	173	15.89	150	16.02	76	8.13	24	2.89
2	226	19.66	237	21.76	130	13.89	49	5.24	14	1.68
4	285	24.80	183	16.80	90	9.61	20	2.14	4	.48
3	223	19.41	113	10.38	33	3.52	5	.53	1	.12
7	112	9.75	37	3.40	12	1.28	1	.11	–	–
6	45	3.92	7	.64	–	–	–	–	–	–
2	7	.61	2	.18	–	–	–	–	–	–
4	1	.08	1	.09	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–
	1,149		1,089		936		935		830	

No. 5.—*Showing Heights of Boston School Boys of American*

AGE AT LAST BIRTHDAY.								
	10 Yrs.		**11 Yrs.**		**12 Yrs.**		**13 Yrs.**	
ent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	1	.26
–	–	–	–	–	–	–	3	.77
–	–	–	–	–	–	–	1	.26
–	–	–	–	–	–	–	6	1.53
–	–	–	–	–	1	.27	4	1.02
–	–	–	1	.29	3	.80	13	3.33
–	–	–	–	–	6	1.61	18	4.60
–	–	–	1	.29	4	1.07	30	7.67
–	–	–	2	.57	16	4.29	32	8.18
–	–	–	5	1.43	23	6.17	46	11.74
–	3	.83	12	3.43	38	10.19	48	12 28
26	5	1.39	19	5.43	28	7.51	44	11.25
53	15	4.17	48	13.71	48	12.87	58	14.83
04	26	7.22	45	12.85	61	16.35	28	7.16
15	34	9.45	49	14.00	52	13.94	26	6.65
51	45	12.47	46	13.14	40	10.72	20	5.12
02	68	18.89	53	15.14	24	6.43	4	1.02
17	57	15.83	28	8.00	20	5.36	5	1.28
59	44	12.22	25	7.14	4	1.07	2	.51
39	44	12.22	11	3.14	2	.53	1	.26
12	11	3.06	3	.85	2	.53	–	–
76	6	1.67	–	–	1	.27	1	.26
5	–	–	1	.29	–	–	–	–
57	–	–	1	.29	–	–	–	–
26	2	.56	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
6	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	360		350		373		391	

entage.

14 Yrs.		15 Yrs.		16 Yrs.		17 Yrs.		18 Yrs.	
o.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	1	5.55	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	1	5.55	–	–
–	–	–	–	–	–	–	–	–	–
1	.52	–	–	1	2.04	–	–	–	–
2	1.04	–	–	–	–	–	–	–	–
–	–	1	1.05	–	–	1	5.55	–	–
1	.52	–	–	1	2.04	–	–	–	–
1	.52	2	2.10	1	2.04	–	–	–	–
–	–	2	4.21	2	4.08	–	–	–	–
2	1.04	–	–	2	4.08	1	5.55	–	–
3	1.56	4	4.21	1	2.04	2	11.11	–	–
3	1.56	–	–	5	10.20	–	–	–	–
6	3.12	3	3.16	3	6.12	–	–	–	–
2	6.25	8	8.42	3	6.12	4	22.22	2	33.33
7	8.85	8	8.42	5	10.20	5	27.77	1	16.66
6	8.33	15	15.80	5	10.20	2	11.11	1	16.66
1	10.93	13	13.68	10	20.41	1	5.55	1	16.66
1	10.93	9	9.47	5	10.20	–	–	1	16.66
2	11.45	9	9.47	2	4.08	–	–	–	–
6	8.33	6	6.31	1	2.04	–	–	–	–
3	6.77	8	8.42	1	2.04	–	–	–	–
3	12.00	2	2.10	–	–	–	–	–	–
3	1.56	2	2.10	1	2.04	–	–	–	–
3	1.56	3	3.16	–	–	–	–	–	–
3	1.56	–	–	–	–	–	–	–	–
2	1.04	–	–	–	–	–	–	–	–
1	.52	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
92		95		49		18		6	

ISEASE OF THE MIND.

By CHARLES F. FOLSOM, M. D.,
Secretary of the Board.

Early Treatment of the Insane.
Pinel's Reform and European Progress.
English Progress and Conolly.
American Progress.
Modern Methods of Less Restraint.
Responsibility for Crime and Definitions of Insanity.
Massachusetts Statistics and Asylum Accommodation.
Supervision by the State.
Certain Asylum Needs.
Medical Education.
Summary.

DISEASE OF THE MIND.*

ons are making rapid progress; and if the States are to keep
r even to keep up with them, they must be anxiously looking
ggestions, and ready to adopt improvements from all quar-
nt McCosh in the International Review, March, 1874.

fest, that if we would hope to keep our institutions up to the
f those of England and France and Germany, it must be done
g activity, by never being satisfied with present attainments,
g the community well advised of the absolute necessity of
to meet this great end."—*Dr. Luther V. Bell's Report for* 1853.

EARLY TREATMENT OF THE INSANE.

ossible to get any fair idea of the present status of
and their treatment without reviewing briefly the
the subject. Mental aberration has, of course,
some form from the earliest times. The ancient
had temples ‡ dedicated to Saturn (Seb) in charge

(on the whole, the least objectionable) is used as signifying a certain
n of the brain, whereby the cerebral functions are impaired to a suffi-
seriously interfere with the ordinary relations of life, or render them
' course this "certain morbid condition" was arbitrarily limited in its
n little was known of the subject; it is meant to exclude a similar
ntal, moral and emotional faculties often observed in many of the
and other diseases.

lesires to express his indebtedness to Rev. W. C. Gannett, Dr. D. F.
r. A. H. Nichols, for many valuable suggestions and criticisms in their
of the manuscript or proof, and to Dr. Edward Jarvis for the use of
are pamphlets, reports, etc., in preparing this paper. Several hundred
ts, reports, etc., have been consulted; but no attempt is made to give
of the subject, which, indeed, would constitute a large volume by
lesire to pursue their investigations farther, the references in the text
-notes will probably be sufficient for their purpose.

ssion of the subject here will be confined within its strictly practical
portions, therefore, which relate to the causes, prevalence, increase,
, have been necessarily omitted, as involving a minute examination of
s demanding a separate consideration by themselves.

known that the Greeks and Romans treated the sick, and probably
ane, too, in rooms adjoining their temples.

of priests, who "cured" the insane by amuse
tion and healthful habits chiefly, but with the p
cise of spiritual influence. In the early Greek
the Old Testament, we find delineations of n
and in the later Greek tragedians, but withou
appreciation of its true character. The pl
mystics: some of them recommended hellebo
Œta, and others extolled that of Galatia or Si
rates first had a fair conception of the real natu
and treats of it, although briefly, on more ratio
Some of his disciples had very clear ideas of it
medical and moral means; but the Hippocrat
them to a secrecy which prevented their kn
becoming at all general. Asclepiades, alth
with Hippocrates in many points of theory, l
the same views with regard to the nature of n
—its dependence on bodily conditions, and it
remedial agents. Plato thought that there wer
mania,—one of purely corporeal origin, and o
tion from the gods.

The first insane asylum of which we hav
knowledge was built by the monks at Jerusalen
century, for their fellows whose reason had gi
the austere penances which had produced
and a St. Simeon Stylites. This was about
after the establishment of the first public h
was built by a Roman lady as a penance and
native city.

In the seventh century, the insane began to
ages to the shrine of St. Dympna* at Gheel,
in the hope that they would there find restoration
time quite a colony of them grew up, living in
the peasants, to which others of the insane were
they could be cheaply cared for there. Late
taken in charge, and in 1851 organized by t
keeping up the daily visit to St. Dympna's

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* An Irish girl who fled thither to escape from a cruel father,
tions, when followed and found by him, became famous. We hav
recently, with a similar movement in the "miraculous appeara
France, and in the annual pilgrimages to that place.

Table No. 11.—*Showing Heights of Boston School Girls of American*

AGE AT LAST BIRTHDAY.									
9 Yrs.		**10 Yrs.**		**11 Yrs.**		**12 Yrs.**		**13 Yrs.**	
No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per c nt.	No.	Per cent.
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	1	.32
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	1	.32	1	.32
–	–	–	–	–	–	1	.32	–	–
–	–	–	–	–	–	–	–	2	.65
–	–	–	–	–	–	1	.32	3	.97
–	–	–	–	1	.34	4	1.29	13	4.23
–	–	–	–	1	.34	4	1.29	18	5.86
–	–	–	–	–	–	12	3.88	32	10.43
–	–	–	–	1	.34	16	5.17	41	13.36
–	–	–	–	4	1.38	33	10.68	47	15.31
–	–	2	.59	12	4.14	26	8.43	35	11.40
–	–	4	1.19	21	7.24	39	12.65	39	12.70
–	–	*16	4.76	28	9.65	45	14.56	23	7.49
5	1.55	11	3.27	33	11.38	39	12.65	19	6.19
6	1.86	31	9.23	41	14.13	29	9.37	19	6.19
17	5.26	43	12.80	36	12.41	33	10.68	7	2.28
23	7.12	55	16.37	40	13.79	13	4.21	4	1.30
38	11.76	58	17.26	30	10.34	7	2.27	1	.32
55	17.03	44	13.10	25	8.62	3	.97	–	–
59	18.27	35	10.42	8	2.76	1	.32	1	.32
60	18.58	19	5.65	6	2.07	2	.64	1	.32
25	7.74	13	3.87	1	.34	–	–	–	–
24	7.43	3	.89	1	.34	–	–	–	–
5	1.55	2	.59	–	–	–	–	–	–
3	.93	–	–	–	–	–	–	–	–
1	.31	–	–	–	–	–	–	–	–
1	.31	–	–	–	–	–	–	–	–
–	–	–	–	1	.34	–	–	–	–
1	.31	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–
323		336		290		309		307	

under the theory of witchcraft and devilcraft. T
of Malta, at that time, received the insane with the
in their hospitals.

In 1751, a few benevolent gentlemen in London
the first asylum in modern times (St. Luke's) for
the insane exclusively. From the first, there we
wards for the curable and for the incurable.

At the very close of the last century, there were
porate asylums and one public in the United Stat
public in England. The private asylums were als
that of the parson-doctor, Willis, in England, bei
celebrated. In fact, the reputation of Willis was s
he was called to attend King George the Third in
attack of mental disease in 1788. His treatment
exalted a personage was arbitrary and dogmatic
treme. Mechanical restraint was liberally use
strait-jacket was one of the common means of "
In his own asylum it must have been the same, a
his more quiet patients he was in advance of h
depended to some extent on an excellent table, reg
general good health and agreeable occupation; but
his attendants to beat the more unruly * when th
it necessary.

The age was one of the most absolute dogmatis
sanity and the phenomena of mind were thought t
the province of the theologian and the metaphysicia
dogma was even more narrow than that of the doc

Neither Hoffmann, Stahl nor Boerhaave had ad
knowledge of insanity. Cullen in Scotland and I
Italy had begun accurate observations; but not
Hunter went to London, in 1748, was the induct
of study in medicine fairly inaugurated, and
far in advance of his time that he never had an
twenty persons in all the years of his lecturing.
he was "a man, who, for comprehensive and origin
comes immediately after Adam Smith, and must b
above any other philosopher whom Scotland has p
his principle of careful deductions from recorded

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* This was also permitted by the regulations of "Bedlar

† Buckle's History of Civilization, II., p. 432.

ıerally adopted in medicine, and nowhere had it to the study of the mind. The regular physistudy mental diseases in the schools, and Warren rious compeers in London looked upon Willis, mous fees, as only a charlatan.

e last quarter of the past century, the insane, irely neglected, were almost universally confined oorhouses, and, of course, in chains. In Scoter, "as large as Hercules," had a reputation for by his severity. In England, the practice of ral hundred pounds a year, by exhibiting the ethlehem Hospital to the populace for a small en up only in 1770. In France, asylums were nly as receptacles for chronic cases, where the ften convicts serving out their time) were allowed . Van Helmont had recommended sudden plungsane into cold water and keeping them there for ts, and that remedy was still used. In this country t was no better. The Spaniards alone, accordl,* especially in the asylum at Saragossa, where n *urbis et orbis* was placed over the door, had a ı-air treatment.

t come within the scope of this paper to enter humiliating records of that age, nor to discuss why the intelligent views of the Egyptians, Romans, so utterly lost in the darkness of the , did not reäppear upon the revival of learning e splendid Elizabethan age.

r religion, the Hebrews transmitted to the Christpe their demon-theory of insanity; and it was less than a century ago that the insane began e efforts of Willis, Pinel, Tuke, Chiaruggi, Reil, and Rush, to be treated as sick people. Then, ys, *wurden die verlorenen Menschenrechte wieder* the lost rights of humanity were regained).

t time no one had described the phenomena of ase so accurately as Shakespeare; no one its nd treatment better than Goethe.

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dico-philosophique sur l'aliénation mentale. Paris, 1801, p. 250.
ische Zeitfragen aus dem Gebiet der Irrenfürsorge, Berlin, 1874.

PINEL'S REFORM AND EUROPEAN PROGRE

France.

The Duc de La Rochefoucauld, Tenon, and a fe Paris took the first steps in the reform of the treat insane which marks the present centenary, a matt their attention had been called by John Howard in Europe in 1780; but Pinel was the great man in He was appointed by the government to examine on the asylums at Paris and Charenton;* and afte 1792, when a mature physician in middle life, and a the Royal Academy, he became superintendent of t the asylum for incurable males. Later still Salpêtr the female insane were confined, was placed under The events of the revolution had filled the ward most excited cases. They were usually sent firs Dieu, the general hospital, where they were ble and douched, and then afterwards to the insane they were thought incurable. The asylum was upon as a hospital, a place of cure.

As soon as Pinel received his appointment, he asked the Commune to allow him to remove the all who wore them, or one-fourth of those conf idea was to them preposterous; but finally, tired o importunity, they allowed Couthon to go with him could be done. After looking over the patients, Pinel, "*Ah, ça! citoyen, es-tu fou toi-même de chaîner de pareils animaux?*" (citizen, are you cra that you would unchain such animals?) He pers ever, removed the chains from fifty-three perso days, beginning with that one who had been thoug desperate, and sought to give them occupation, n his servant, interesting others in attending to t needing care than themselves, etc.,—apparently hint from Thouin, of the insane asylum at Amste employed the quiet inmates in taking care of oth then the custom generally in Holland. Pinel kept before him his independent motto, "*Chercher à*

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* Then established about a half-century.

*prévention, toute opinion adoptée sur parole** (to
all illusion, all prejudice, all opinion taken on
He still, however, held the strait-jacket (*gilet*
high repute; and although he was the first in
to adopt the "moral treatment"† in a public
ractice may be inferred from his choosing large
men for his attendants.

almost nothing of pathology. He read Hip-
etæus, Galen and Celsus. The contemporary
rs and their theories he cared little about. He
fly in careful observation of the insane them-
never for a moment countenanced the force,
d ingenious tricks of surprise and terror in
use at that time. Cullen, with his theory of
f insanity,—(1) mental, (2) corporeal, (3) of
n,—he regarded as simply a little above the rest
ists. The German writers, generally, he con-
en less practical than the English and Scotch;
reding, whose two hundred careful autopsies he
h approbation as praiseworthy efforts, although
any relation could be established between post-
arances and intellectual derangements observed
His knowledge of psychology he got chiefly from
ontaigne, Locke, Harris, Smith and Stewart.
five classes of mental disease: (1) melancholia,
nplicated with hypochondriasis; (2) mania with-
or incoherence; (3) mania with delirium; (4)
) idiocy. Still, even in this, he was in advance
for, according to the Vienna school, there were
isions: (1) maniacal delirium, and (2) melan-
m.

was slow in its advances. Following Greding in
made careful autopsies and dissections and ex-
f the brain; but these were fragmentary bits of
il Bichat appeared,‡ the greatest investigator and

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of this great work, by Pinel's son, may be found in the Mémoires
yale de Médecine, Tome V.

been used since Pinel's day to indicate amusement, occupation, and
ating influences.

Générale was published in 1801, and the Recherches Physiologiques *arentage.*

14 Yrs.		15 Yrs.		16 Yrs.		17 Yrs.		18 Yrs.		INCH
No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	
–	–	1	.29	–	–	1	.78	–	–	. .
–	–	–	–	1	.43	1	.78	–	–	. .
–	–	–	–	1	.43	1	.78	–	–	. .
–	–	1	.29	1	.43	3	2.34	3	4.61	. .
–	–	3	.88	11	4.77	7	5.47	6	9.23	. .
6	1.56	4	1.17	11	4.77	8	6.25	3	4.62	. .
5	1.29	14	4.09	15	6.46	19	14.80	7	10.76	. .
12	3.11	19	5.56	38	16.38	13	10.16	11	16.92	. .
8	2.07	25	7.31	39	16.81	18	14.06	11	16.92	. .
20	5.18	37	10.82	29	12.41	21	16.41	12	18.46	. .
32	8.29	38	11.11	25	10.78	13	10.16	6	9.23	. .
32	8.29	35	10.23	20	8.62	7	5.47	3	4.62	. .
35	9.07	42	12.28	17	7.33	9	7.03	1	1.54	. .
34	8.81	26	7.60	11	4.77	2	1.56	1	1.54	. .
39	10.10	31	9.06	7	3.02	2	1.56	1	1.54	. .
42	10.88	29	8.48	5	2.15	2	1.56	–	–	. .
49	12.69	14	4.09	–	–	–	–	–	–	. .
27	6.99	6	1.75	–	–	–	–	–	–	. .
14	3.63	5	1.46	1	.43	–	–	–	–	. .
11	2.84	5	1.46	–	–	–	–	–	–	. .
11	2.84	4	1.17	–	–	1	.78	–	–	. .
6	1.56	2	.58	–	–	–	–	–	–	. .
–	–	1	.29	–	–	–	–	–	–	. .
1	.26	–	–	–	–	–	–	–	–	. .
2	.52	–	–	–	–	–	–	–	–	. .
–	–	–	–	–	–	–	–	–	–	. .
–	–	–	–	–	–	–	–	–	–	. .
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–	–	–	–	–	–	–	–	–	–	. .
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–	–	–	–	–	–	–	–	–	–	. .
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–	–	–	–	–	–	–	–	–	–	. .
–	–	–	–	–	–	–	–	–	–	. .
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386		342		232		128		65		

—*Showing Weights of Boston School Boys. Whole Number of Observation*

AGE AT LAST BIRTHDAY.									
9 Yrs.		**10** Yrs.		**11** Yrs.		**12** Yrs.		**13** Yrs.	
No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
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–	–	–	–	–	–	1	.08	–	–
–	–	–	–	–	–	–	–	2	.17
–	–	–	–	–	–	–	–	1	.09
–	–	–	–	–	–	1	.08	3	.20
–	–	–	–	–	–	1	.08	1	.09
–	–	–	–	–	–	–	–	3	.26
–	–	–	–	–	–	2	.16	3	.26
–	–	–	–	–	–	2	.16	4	.34
–	–	–	–	–	–	–	–	5	.43
–	–	–	–	–	–	4	.32	12	1.03
–	–	–	–	–	–	5	.40	15	1.29
–	–	1	.07	–	–	8	.64	30	2.59
–	–	2	.15	3	.23	12	.96	41	3.53
–	–	–	–	3	.23	16	1.28	59	5.09
–	–	1	.07	13	1.00	32	2.55	60	5.17
1	.06	4	.29	16	1.24	57	4.55	93	8.02
1	.06	12	.88	29	2.24	76	6.06	131	11.29
3	.20	18	1.32	56	4.33	129	10.30	151	13.02
2	.13	42	3.08	100	7.73	157	12.53	177	15.26
23	1.60	112	8.22	175	13.53	219	17.48	158	13.62
55	3.82	166	12.18	235	18.18	219	17.48	117	10.10
121	8.42	270	19.81	258	19.95	144	11.50	52	4.48
251	17.47	262	19.22	201	15.55	100	6.37	28	2.41
343	23.87	227	16.65	117	9.05	36	2.87	10	.90
336	23.38	150	11.00	64	4.95	24	1.92	4	.34
208	14.48	79	5.79	18	1.39	8	.64	–	–
76	5.29	14	1.03	5	.38	–	–	–	–
14	.97	2	.15	–	–	–	–	–	–
3	.20	1	.07	–	–	–	–	–	–
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–	–	–	–	–	–	–	–	–	–
1,437		1,363		1,293		1,253		1,160	

who, when twenty-two years old (1839), was
physician in one of the asylums of Germany
tinguished services for the following twenty-ni
the time of his death, well earned for him his
"greatest of modern alienists." Like Pinel, he
the narrow sense, a specialist, for his contributio
medicine alone would have rendered him famou
established the diagnosis of diseases of the mi
exact basis and by logical, methodical processe
which he got great assistance from his illustriou
rary, Virchow, the acknowledged head of the me
present day as based upon scientific research
pathology, and as great in his time as John Hunte
were during the last half of the past and at the
the present century.

In 1845, Griesinger strongly recommended t
tion of the clinical study of mental disease in the s
at Tübingen, where he was then lecturing, he had
for carrying out his design. He began this kin
instruction at Zürich in 1864, as had then already
Erlangen, Würzburg, Munich and Göttingen. T
was taken in Berlin* in 1865, by Ideler, whon
succeeded in the following year as professor of
medicine and physician to the department for t
the Charity Hospital.

At the present time, in the study of the ph
pathology of the brain, based upon exact researc
stands easily first; and the great universities o
Vienna, under Westphal and Meynert, take th
work where there are so many distinguished
that it would be useless to try to even name then

Most of the improvements in hospital-constru
many have come from England and the United
just as the first permanent "American hospital
separate buildings found so successful during o
was built in Germany, so is German science now

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* In Vienna, also, about the same time.

† It is not possible to consider this subject here, or to discuss the
held by Hitzig and Brown-Séquard. The present position of scie
point may be found in articles by Prof. H. P. Bowditch in the Bosto
Journal, July 20 and 27, 1876; and in the British Med. Journal, De

the first insane asylum* which embodies the present knowledge of the subject.

ENGLISH PROGRESS AND CONOLLY.

In 1796, four years after Pinel's great reform, a Quaker layman, William Tuke, abolished the chains of the insane in his part of the world, in building the "Retreat" at York, England.

After Pinel and Tuke, the next great step in advance was made by Conolly, a mature English physician of forty-five; but, in order to understand his work, and the peculiar need in England of such work, it will be necessary to review the history of mental disease in that country, although very briefly. A full account may be found in the reports of the parliamentary commissions of 1807, 1815, 1827 and 1844.

In 1815 patients were chained to the walls of the best asylum in London; at Fonthill, thirteen out of fourteen were in chains or handcuffs, and in another asylum there was one towel to 170 patients. In 1822, in some counties, jails were converted into asylums for the insane without change of structure, and were so used as late as 1842. In 1827, at Bethnal Green, with its 500 patients, some were chained to their cribs and confined from Saturday evening till Monday morning, in order to give the attendants their Sunday holiday. No physician or surgeon was in charge, but an apothecary visited two or three times a week.

The first commission† to look after pauper lunatics was appointed in 1828, and that for the metropolis of London only. Up to that time, the only Act in force enabled any two justices to cause them to be apprehended and to be locked up in some secure place "and there chained"; and if the pauper's settlement should prove to be in another parish, then he was to be forwarded thither, and "locked up and chained" by the justices of that district.

In 1828 twelve counties in England had provided asylums

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* See Professor Westphal's letter, page 379.

† The origin and duties of the office of Lord Chancellor's Visitor are so admirably given in Dr. Bucknill's letter at a subsequent page, that only a reference to it is needed here.

for the insane, although the law requiring them
1808. Six more had been built in 1841. Many
no physician in attendance; in nearly all mechan
and coercion were used to a great extent; a
inspection got by those outside of London was
lar, uncertain, and often infrequent visits of m
local officials, who were interested in keeping
low as possible. In the private asylums t
inspection, and in the jails little better than n

From 1829 to 1831 over one-half of the
Ringmer were in restraint at once. In 1837*
worst faults existed in asylums, and few had the
the public; but it would be unfair to imply th
not others where there were employment and
means of treatment, and tranquil wards, wh
might ask with the statesman Burke, after h
modern asylum, "Where are the insane?" as h
had seen none such.

Coleridge probably gave the sentiment of
people of the time, and the doctors followed hi
he the doctors. He says:† "Madness is not si
disease. It is the sleep of the spirit with cert
of wakefulness; that is to say, lucid intervals.
sleep, or recession of the spirit, the lower or be
life rise up into action and prominence. It is a
to be eternally tempted by the perverted senses
may resist—it does resist—for a long time; b
at length, it yields for a moment and the man is
An act of the will is, in many instances, prece
plete insanity. I think it was Bishop Butler wh
was all his life struggling against the devilish
his senses, which would have maddened hi
relaxed the stern wakefulness of his reason
moment. . . . When a man mistakes his
persons and things, he is mad. A madman is

By 1840 there were many private asylums in
in that year, it was found necessary to enact a la

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[*] What Asylums Were, Are, and Ought To Be. By W. A.
Superintendent of the Montrose Asylum, Edinburgh, 1837.

[†] Table Talk, 1830 and 1832.

misdemeanor for a superintendent of any of them to keep a patient concealed from the commissioners for the metropolis. In 1842 there were 162 asylums, including those of a private class, and the abuses were so great and so frequent that the Lunacy Commission (previously the Metropolitan Commission, above referred to), composed of twenty leading men, of whom seven were physicians, was appointed in that year to visit "all places throughout the kingdom in which persons alleged to be of unsound mind are confined." They were required to visit, one physician and one lawyer together, the licensed houses in the metropolis four times a year; other licensed houses, twice a year; and county asylums, jails, and workhouses, once a year. It would be difficult to overestimate the good which they have done in advancing the knowledge of their specialty and in improving asylums directly in England, and indirectly throughout the civilized world.

In 1847 there were 177 county asylums, hospitals, and licensed houses, 437 separate establishments for single patients, and 596 workhouses, the inspection of which by the local authorities was very unsatisfactory. Six of the asylums had been visited twice in twenty months; eight, three times; nine, four times; and one not for two years. The evasions of the laws had been so numerous that a special Act had been passed in 1845, allowing the commissioners to enter and examine the asylums by night.

It is not necessary to enter into details, or to narrate particular instances. Enough has been said to show that a third of a century ago the condition of the insane in England was such as to demand some radical change.

Conolly's Work.

Conolly's interest in mental disease began while he was a student, and his graduating thesis was on that subject. He early gained a high reputation, and was called to a professorship of clinical medicine in London, but his chief interest was in diseases affecting the mind.* His attention was especially directed to the needs of the insane in England by the work of R. Gardiner Hill, of the Lincoln Asylum. that there, in 1830, an aggregate of 27,113¾ been spent in mechanical restraint by 39 of tients; and that in 1838, with a largely incr ber of inmates, namely, 158, not one had b restraint during the whole year. He heard, to change in treatment had been adopted becaus means used to restrain the patients had been cause of the death of two of them.

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* A Memoir of John Conolly, M. D., D. C. L., by Sir James Clark, Bart., London, 1869.

Hill had became so unpopular with other ph with the officials, by reason of this innovation, compelled to resign his position; and it is proba movement would have stopped there, had it not up by a man who, like Pinel, thought independen out his honest convictions, and did his work well.

As soon as Conolly was appointed superi Hanwell (in 1839), he visited the Lincoln Asy request of one of his trustees, who had formerly h position there, and introduced the non-restrain course which was even disapproved by the Luna sion; but, in sixteen years, he could say that h unable to show his classes any extremely vi whereas, in 1840, the asylum was full of them. suppose, however, that mechanical restraint co pensed with in all cases and under all circums benefit to the patient, as he testified in the tri Phelp. His system has spread over all Englan later day over Scotland, sometimes by the pres Lunacy Commission against the wishes of the sup and occasionally, it must be acknowledged, with diate bad results, but with ultimate good.

One of Conolly's admirers says of him: "It ap that the fact that the principles laid down by hi almost universally accepted and acted upon by to whom he was personally unknown, is a far high to the sagacity of his judgment, than the adhesion of those, who, knowing him well, were influenced enthusiasm and by the persuasive eloquence of his t

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* Address of the President of the British Medico-Psychological As T. L. Rogers, 1874.

l Griesinger have introduced the non-restraint ermany, Van der Kolk in Holland, and Morel in it has not yet been entirely adopted in either of es.

he English commissioners say: "Asylums were structed as if violence were the rule in the con- lunatics. They are now constructed as if it were n; and it is the exception." Since that date, es have been made in that country, which will be t a later page.

American Progress.

ntry, the province of Pennsylvania was the first its duties to the insane. Some benevolent per- l by Dr. Bond, took steps in Philadelphia in lish "a small provincial hospital." In 1751 the assed an "Act to encourage the establishing of a he relief of the sick poor of this province, and ption and care of lunaticks," a considerable e money being subscribed by private individuals. , 1752, the first patients were received in the emporized out of a private dwelling), of whom first four admitted were insane. In the first two een suffering from the "disease lunacy" were whom two were cured. The trustees com- eir first report, that many were taken away by e the cure was established, and passed a resolve one hereafter who are not allowed to remain s in the house, if not cured sooner, or judged cians to be incurable." As there had been con- osition to the project on the part of some mem- egislature, on the ground of expense, the visiting ve their services, and at first charitably supplied s prescribed by them.* The insane were kept in asement of the building until 1796.†

nin Rush returned from his three years' visit and

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on the Occasion of the Centennial Celebration of the Founding of Hospital, delivered June 10, 1851, by Geo. B. Wood, M. D.

building was erected and occupied in 1841, now, in many respects n the world.

study in Europe in 1769. He began his visits to the insane in the hospital in 1783, treating them, in the main, with doses and bleedings, as he did his other patients, but still as sick people.* He of course knew little of exact science, and at that time nothing of the "moral treatment." His "Diseases of the Mind," for which we are indebted to this hospital's experience, is, according to Dr. Isaac Ray,† "the first of the kind in the English tongue, displaying thorough observation and original thought." Rush, the "American Sydenham," is well called by Dr. Bowditch, in his centennial address at Philadelphia, one of the most noteworthy men of the past centenary, although essentially a medical-system maker. He soon saw the wrong of the whips and chains in use in the treatment of the insane in his time, and gave them up for other; namely, "mild and terrifying modes of punishment." He thought it important, upon being called to see a patient suffering from mental disease, "to look him out of countenance." He recommended low diet, consisting of vegetables only, bleeding, purging, emetics, blisters, salivation, darkness, cold baths, etc. Up to the time of his death, in 1813, there were four cells in the hospital "so formed that it was possible to make them dark with but little trouble." In the later years of his professorship, he introduced the moral treatment of Pinel to some extent, and speaks of the advantages of music, employment, etc., although he did not give up his other remedies for the more violent cases.

In 1773 the first state asylum in this country was established in Williamsburg, Virginia (including Kentucky, which was not made a separate State till 1792), Mr. James Galt having been appointed keeper, an office which he retained forty-nine years. The Act of the General Assembly, in 1769, stated the desired end to be for "effecting a cure of those whose cases are not become quite desperate, and for restraining others who may be dangerous to society." Dr. Sigueyra was appointed visiting physician when the asylum was opened. The first resident physician and superintendent, Dr. John M. Galt, Jr., was appointed in 1841.

In 1769, Dr. Samuel Bard, in an address delivered in

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* Some Account of the Pennsylvania Hospital, Philadelphia, 1817.

† Contributions to Mental Pathology, p. 6.

Columbia (then King's) College, New York, "so warmly and pathetically set forth" the need of a general hospital, that a subscription was at once set on foot, aided by friends in England. A building begun in 1773 was nearly destroyed by fire in 1775, and the war of the Revolution prevented its completion before 1791, when it was opened for general diseases. In 1797, two cases of mania were admitted, but, as one is reported as having died there in the same month, there must have been previous admissions, although there is no record of them. A separate hospital for the insane was finished in 1808, with the help of the Legislature; and in 1821 the still better Bloomingdale Asylum took its place.*

The "Maryland Hospital," the next in order, organized by two physicians, was established in Baltimore in 1797 for general diseases and insanity. It was enlarged in 1807, and remained a private institution until 1864. In 1828, the late Dr. R. S. Steuart was appointed visiting physician and president. Since 1836 there has been also a resident physician. In 1828 the hospital was organized for the exclusive treatment of the insane.

In connection with the recent steps in England to introduce more refining influences in their male wards by having female attendants, one portion of Dr. Steuart's work is of especial interest; namely, his exclusive employment of female attendants as early as 1835, even in the male wards. Rush had called attention in 1812† to the fact that the insane in Java, who were able to do so, employed female attendants, and that under their "mild and soothing influence" the proportion of recoveries was large, but that treatment had not been adopted elsewhere.

We began the century with four asylums, of which only one had been built entirely by the State. Private institutions were almost unknown, and the few that existed were only better than the jails and poorhouses, where many of the insane were kept.

In 1813, some Friends in Philadelphia called the attention of their community to Tuke's work in England, and, the next year, published "The Account of the Rise and Progress of the Asylum, with an Abridged Account of the Retreat, near York, in England." After having purchased fifty-two acres of land at Frankford, near the city, they got money and began building a hospital, which was opened in 1817, that the insane might see that they were "regarded as *men* and *brethren*." A resident physician was appointed, and, although a great deal of restraint was the rule, the patients did all the work on the farm. "Whether the symptoms were mild or severe, treatment the most soothing and gentle was uniformly extended." In receiving patients, preference was given to recent cases, of which three were cured in the first year; there were nineteen admissions. In 1824, as some uneasiness was expressed lest the rule at this hospital, requiring security for the payment of damages done to the glass and furniture by the patients, should operate as a discouragement to the applications for admission, the trustees thought best to state that "the whole amount of charges of this nature against the patients, during the seven years since the asylum was opened, is $30.19 on account of glass broken, and $27.17 for damages done to furniture."* Their example induced the giving up of chains, etc., at the State Asylum of Kentucky in 1826.

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* History, Description and Statistics of the Bloomingdale Asylum for the Insane. By Pliny Earle, M. D., Physician to the Institution.

† Medical Inquiries and Observations upon Diseases of the Mind, p. 178.

In establishing the McLean Asylum at Somerville, adapted from a private residence, in 1818,† just three years after the opening of the Harvard Medical School in Boston, Massachusetts was the fifth of our States to provide for their insane. In their address to the public in 1814 and 1816, the trustees dwell on the curability of insanity and the importance of its proper treatment.

The founding of this asylum marks an important era in the history of mental disease in this country. It established the character and principles of treatment which have become universal with us, and especially the principle of state supervision. The trustees were men of broad views and high character. Part of them being appointed by the governor, the State has thus exercised constant supervision over the interests of the patients. In nearly sixty years, their faithful and careful weekly visits to the asylum have been only once omitted.* In advance of the usual practice, at that time, too, a resident medical superintendent was appointed, Dr. Rufus Wyman, whose reports one need only read to appreciate how well he was fitted for this, a pioneer's work.

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* Trustees' Reports for 1818 and 1824.

† Thomas Hancock left some money to the town of Boston for a small-pox hospital and lunatic asylum, between 1760 and 1770, and there were two more legacies in 1797 and 1798 by Thomas Boylston and William Phillips. In 1810, Drs. Jackson and Warren appealed to the public so successfully that the Massachusetts General Hospital was chartered by the Legislature in the following year. In 1816, after the depression caused by the war of 1812, 1,047 persons subscribed to one or both departments of the hospital. John McLean, by his noble donation in 1821, gave to the asylum his name.

From October 1, 1818, to December 31, 1821, he reports 121 patients discharged, of whom 32 were cured; 28 remained. In 1822, he says,† "In this part of the country the disease had been generally believed to be incurable;" "it is too true that such treatment [whips, chains, etc.] in time not long past, has been approved and often advised by medical men. An entire revolution of opinion respecting the treatment of lunatics has been produced"; "kindness and humanity have succeeded to severity and cruelty." The estimation in which the community held the asylum may be inferred from Dr. Wyman's observation, that for the chronic insane "the establishment has been considered a comfortable winter residence, where the boarders would enjoy the benefits of apartments well warmed, well ventilated, and free from the dangers of fire."

In speaking of Dr. Wyman's work, Dr. Bell said, in 1843, "To this day scarce any institution can be visited in the land where evidences of the operations of his mind do not present themselves on every hand."

The "Retreat" at Hartford, Conn., a corporate asylum like the McLean, and the State Asylum of Kentucky, were opened in 1824. The Kentucky Asylum was simply "for the comfort and safe-keeping of persons of unsound mind," as stated in the Act. It was adapted from a building intended for an ordinary hospital (the Fayette). As the patients were put under the charge of a keeper, with the paraphernalia of handcuffs, shackles, strait-jackets,* etc., the word "comfort" in the Act could not have been used in its ordinary sense. There was no medical care until 1844, when a physician was appointed superintendent.

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* History of the Massachusetts General Hospital, by Nathaniel I. Bowditch, with a continuation by George E. Ellis, D. D.

† Report to the Trustees, pp. 24, 25, 27 and 28.

Virginia with its second asylum, and North Carolina with its first, followed in 1828. In 1830, Massachusetts founded the Worcester Asylum "for the safe-keeping of lunatics and those furiously mad" in the words of the Resolve of the Legislature, at last accepting the noble words of one of her most far-sighted legislators, the late Horace Mann, that the insane are the wards of the State, a principle which has become that on which all civilized nations now attempt to act. The hospital was open for patients in 1833.

The other States of this country followed: Vermont in 1836; Ohio in 1838; Maine in 1840; the first state asylum in Pennsylvania in 1841; New Hampshire, Georgia, and the State Asylum in Maryland in 1842; the first public asylum in New York in 1843; Rhode Island in 1845; Indiana in 1847; New Jersey, Louisiana and Illinois in 1848; Tennessee in 1849; Missouri in 1851; California in 1853; Mississippi in 1855; North Carolina in 1856; District of Columbia in 1858; Michigan in 1859; Wisconsin in 1860; Alabama, Iowa and Texas in 1861; the first state asylum in Connecticut in 1864;† Kansas in 1866; West Virginia in 1867; Minnesota in 1870; Nebraska in 1871; and Oregon a few years later. The first asylum for the former slaves of our Southern States was established out of an impoverished treasury by Virginia, in 1870, using a hospital formerly occupied by the Freedmen's Bureau. It will be remembered that Virginia was the first of our States to build a public insane asylum.

At the present time we have (1876) sixty-eight public asylums, accommodating, including those not yet occupied, about 30,000 patients. Dr. Conrad gives a list of nineteen private and corporate hospitals (not including those which are quite small), with a capacity for about 2,600 patients. This number, 32,600, is probably from one-half to three-fifths of our total number. There are probably considerably less than

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* Insanity in Kentucky, by Edward Jarvis, M. D.; Boston Medical and Surgical Journal, 1841, p. 165.

† Previously, the state patients were at the "Retreat" at Hartford.

200 in all the private asylums of the United States.* Fifty-five of these state asylums, accommodating 27,000 patients, cost $29,879,258.†

Many of these asylums were built by the States almost wholly through the efforts of Miss Dix, whose philanthropic labors, begun a third of a century ago, have been the means of many great advances in the comfort of a helpless class, both in this country and in Europe. She visited the poor-houses and county jails, finding her way into hidden corners and tearing official tape, against obstacles which would have daunted a less heroic spirit; and thus thoroughly informed of her subject, she appealed so eloquently to our Legislatures, that many an asylum has been the direct work of her hand and brain. Her frequent visits to our institutions for the insane now, and her searching criticisms, constitute, of themselves, a better "lunacy commission" than would be likely to

On page 346, line 5, for North, read South.

until about twenty years ago, this country in its state asylums was in advance of Europe. Dr. Browne of Edinburgh, in his lectures on "What Asylums Ought To Be," said in 1837, "in some parts of America there appears to be an ample realization of all that I have wished to inculcate as necessary to place the lunatic in that condition which is most conducive to his happiness and recovery." Writing in 1841, Dr. Edward Jarvis said, "most of the American asylums are doing more for the cure of insanity than any others in the world."

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* It is impossible to more than guess at the number of the insane in nearly all of our States. By the United States census of 1870, for instance, there were 1,625 insane in Illinois, whereas the State Board of Charities found 2,376; and of these, only 721 were in both lists. The United States census of 1870 makes the number of the insane in Massachusetts as 2,662, and the idiotic 778, whereas the state census of 1875 makes the numbers respectively 3,637 and 1,340, which is probably not so far from the truth as the former number. By the census of 1860, the insane in the United States numbered 23,999, but Dr. Pliny Earle estimated their real number at 40,000. By the same census, the insane in Massachusetts were stated to be 2,105, although Dr. Edward Jarvis had found, five years previous, that there were 2,632 insane, and 1,087 idiots.

† Insanity; Its Financial Relations to the States, with Statistics. By J. S. Conrad, M. D., Resident Physician to the Maryland Hospital for the Insane, 1876.

In 1838, Dr. Isaac Ray published his "Medical
dence of Insanity," a book far in advance of Casper
and Marc, and one which, after having passed throu
editions, is still the first authority in the English
It is not claiming too much for our country to say
great advance in the social position and legal sta
insane during the last third of a century has been
to the teachings of our distinguished countryman th
other one person.

A pleasant picture of the asylum life at Somervil
just after Dr. Wyman's death, is thus given by Dr
successor: "The patients rise and dress about ha
before breakfast, which is at sunrise in the winter
o'clock in the summer. After breakfast they are
to walk or ride, or are engaged, as far as possible
labor, as farming, sawing and splitting and piling
assisting their attendants; and a few are engaged i
ical employment. A large number are occupied m
in the amusements of bowling, quoits, throwing the
in checkers, chess, backgammon, and other game
the interval of these amusements, reading books
library, newspapers, and writing serve to fill up
After tea they are assembled in the oval room
worship, which consists in reading a chapter from
singing two hymns, and a prayer. . . . Our
convalescent patients are also taken with us to churc
places of interest and amusement, are taken into c
dine at our table, and sit in our parlors. . . .
restraint is in no case made use of except with thos
to tear clothing or other property, and with the
prevent injury to themselves or others. The
always small who require any personal restraint."

In 1841, Dr. Ray was appointed medical superin
the Maine State Asylum, at a time when Conolly
begun his great work in England, and Miss Dix
through the poorhouses, jails, etc., of this count
the attention of our Legislature to the deplorable c
the insane. Dr. Ray's reports, especially that of
a fair view of the treatment of mental disease in
asylums about that time.

er V. Bell was then superintendent at the McLean r. Thomas S. Kirkbride at the Pennsylvania r. Samuel B. Woodward at the Massachusetts Worcester,* Dr. Pliny Earle at the Blooming- in New York, Dr. William M. Awl at the Ohio m, Dr. Amariah Brigham at the New York State ere, in 1844, he established the American Journal the first in the English language on that subject,† tarted with the position that insanity is purely a ease. Dr. Edward Jarvis had begun his statistical and Dr. Samuel G. Howe was at the height of a has deservedly given him the name of the Massa- lanthropist.

re all marked men, who exercised a great in- whose work has been as various as their talents. d Dr. Woodward were men of wide general and eminently fitted for a work requiring breadth een observation, sound judgment, and independ- Dr. Kirkbride devoted himself to hospital with a zeal and practical sagacity which made n asylums of that day absolutely without rivals. On the Construction, Organization, and General t of Hospitals for the Insane" (1854) is still the Association of American Superintendents to hole ground. Dr. Earle and Dr. Jarvis have ocial and vital statistics of insanity on a par with country. Dr. Awl was chiefly interested in the the insane by the State, in which he did excellent Brigham gave his fine intellect to combating the n prevalent to a great extent even among doctors, n be a disease of an immaterial mind independent cal organs. Several years before (in 1832) he ed a treatise on the Influence of Mental Cultiva- alth, in which he defined insanity as a disease

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elation to his patients is illustrated by the fact that in taking the he deputy marshal says there were so many lunatics "in the family oodward, in Worcester."

ift für Psychiatrie was first published in 1845; The Annales giques in 1844; The Annales d'Hygiène Publique et de Médecine The Quarterly Journal of Mental Disease (London) in 1852. There rt-lived journals in Germany much earlier, the first in 1783.

"produced by morbid excitement of some port brain." Dr. Ray was without a rival in jurispr the phenomena of mental disease.

In 1844, also, three years after a similar society in England, Dr. Awl, Dr. Kirkbride, and Dr. organized the Association of Medical Superin American Institutions for the Insane; the first n held in Philadelphia the same year.*

American Principles of Treatment.

Our medical treatment, too, was at least not age. In fact, bleeding, as a remedy in insanit uncommon in this country some time after it c general use in England. Our knowledge of hosp was shown by Dr. Bell's address on that subje an essay which would do credit to a much later "moral treatment" is testified to by the follow from reports of that time: †—

"In a word, we endeavor always to treat our patie honorable, well-bred man treats another in the commo of society."

"Generally speaking, the more they (the insane) a act like other men, the more they will strive to become

"The idea of improving the mental faculties of ra by confining them together in large numbers, without bodily or mental exercise, would be not more absurd, expecting to restore the minds of the insane by a simil Until recently, however, it was universally supposed, least, that the insane are incapable of any occupation amusement. It was thought unsafe to trust them wi and supposed that they had too little control of thei passions to be able to work to any advantage. It was ration to establish the truth, that useful labor is safe, interesting, and remedial to a large portion of the l why should it not be so? The most of them have powers unimpaired, and their minds being deranged in subjects, may feel no less interest than ever in some stry, nor less ability to engage in it personally."

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* History of the Association of Medical Superintendents of Amer for the Insane, by John Curwen, M. D., Secretary, 1875.

† Probably this description of an English asylum in 1841 coul applied to any of ours at any time during the present century. Ou 29 "were wearing either hand-cuffs, leg-locks, or strait-waistco between 30 and 40 patients who were chained down during the so constructed as to answer all the purposes of water-closets, in roo appellation of 'warm-rooms'; moreover, during the nighttime all violent patients were chained or otherwise secured in bed. It was a custom to place every case, on admission, under restraint during th longer or shorter period as might appear expedient." (From the rep asylum for the county of Lancaster for 1841.)

ighty-two patients that have been in the hospital in the e year, we find that fifty-one have worked regularly day, and a few others have labored occasionally." *Ray, 1841.*

he remedies [for mental disease], none can compare wherein I include all useful employment. No other is adapted to so large a proportion of the insane, and so many of the various forms of the disease. . . . ly excited patients the surplus nervous energy will be no other way is provided, in mischief and noise; but ended in useful labor, and, although the work may not rfectly done, yet the patient thinks it is, and he expe- kind of gratification which springs from the conscious- ng done a good thing, and consequently, so far as it und and laudable feeling. This feeling the guardian of nnot too carefully watch over and foster, for it directly ncrease of self-control and self-respect. Indeed, many l refrain, for the first time, from destroying his clothing is attendants on being allowed the privilege of going . . Even some of the most demented will be found oing something, and though it may not be very profita- eps them out of mischief, and contributes to the quiet . . . While writing this, there is not a single patient ution with any kind of restraint upon the person; and the case for many days together. Occasionally, the er restraint may amount to four or five, but probably would not average more than two or three."—*Dr. 1844.*

lication of the severe measures reported as discarded never was heard of in our asylums,* and but a few measures deemed so insignificant as to form no excep- ver been found necessary here."†—*Dr. Bell, 1840.*

ar that I have passed in this extensive field has served my confidence in an active medical treatment of almost of disease of the mind, and to increase my reliance on s. . . . The practice of bleedings, violent purga-

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. Bell refers to our state and corporate asylums only.

eaking of New England institutions after a visit to England.

tions, emetics, vesicatories, and derivatives, has passe
the light of experience. A different and opposite n
ment by energetic sedatives, I am satisfied, is obnox
objections, although far to be preferred to the last
wise expectation and a cautious use of medical agents
toms, comprise most of the aids that the pharmacop
of affording. But in relation to the moral means, esp
through as they can be only by the instrumentality of
institution, my annual experience has only exalted m

"The general law, both as regards the curative trea
todial comfort, is constant but varied occupation of b
To ensure this requires every opportunity and aid
amusement. The more perfect the system of an in
more ample will be the provision to secure these ends.
V. Bell, 1842.

"Fortunately, in this country there never have bee
tutions any abuses, nor, under the thorough system of
inspection which all our public establishments have sec
is it scarcely possible that there ever can be any
regard requiring that the feelings of the community s
tiated by the affectation of disusing all forms of m
straint."—*Dr. Bell, 1843.*

Speaking of the McLean Asylum, Dr. Bell
some years the average number of patients under
of leathern mittens has not exceeded one per cent
and often week after week elapses without e
instance."

In 1847, Dr. Bell says, "a number of mante
open fires have been arranged in the Belknap
greatest comfort and satisfaction of its occu
1848, he says, "personal restraint, as in som
years, has been used only in two cases, where
could not be avoided without risk to the patient"
in 1850, it was used in only two or three cases, a
forms of mechanical restraint [except the Wyma
have been abandoned with us for a number o
with no reason thus far to regret their disuse."*

"The executive officers of this institution have g
doned the most exceptional forms of restraint, an

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* Report for 1849, p. 19.

ose of a milder character. They have never, how- roselytes to the doctrine of the absolutely entire dis- aining apparatus. There are exceptions to all rules governed by the invariable law of mathematics or of nd no argument, however subtle or specious, or, to however strongly based, theoretically, upon benevo- iropy, kindness, and the golden rule of 'doing to vould, under similar circumstances, that they should n overthrow our belief founded upon the observation s, that there are cases in which the welfare of the e dictates of true humanity require a resort to some eans. . . . There was one period of thirteen which restraint was resorted to but in two cases in rtment. In one of these, the patient, while in a con- oid delirium, wore a camisole three days; and in the ent's hands were similarly confined a few hours, to ication of a blister."—*Dr. Earle's report, 1848.*

iis, the excited insane were found by a committee lature, in 1848, to be at the Worcester Asylum rooms, "having the least advantages for light, ilation, unfavorably located, dark, dreary, damp rtable to that extent as to aggravate rather than cure of the unfortunate beings placed there"; the insane at the McLean Asylum, then considered est, were kept in stone cells in the cellar; and ndicates the general knowledge of the time. The condition of the more quiet of the insane in asy- ery much better, of course; but it was reserved udy and experience to show that the most violent ed to a certain extent in a similar way.

Later Progress.

six years before the establishment of our first of Health, Dr. Ray published the first systematic e English language on mental hygiene.* How unity, and indeed the medical profession, were eady for it, may be judged from the fact that in s the first edition has not been sold.

he Willard Asylum for the Chronic Insane was vid, N. Y. It had long been a problem in all

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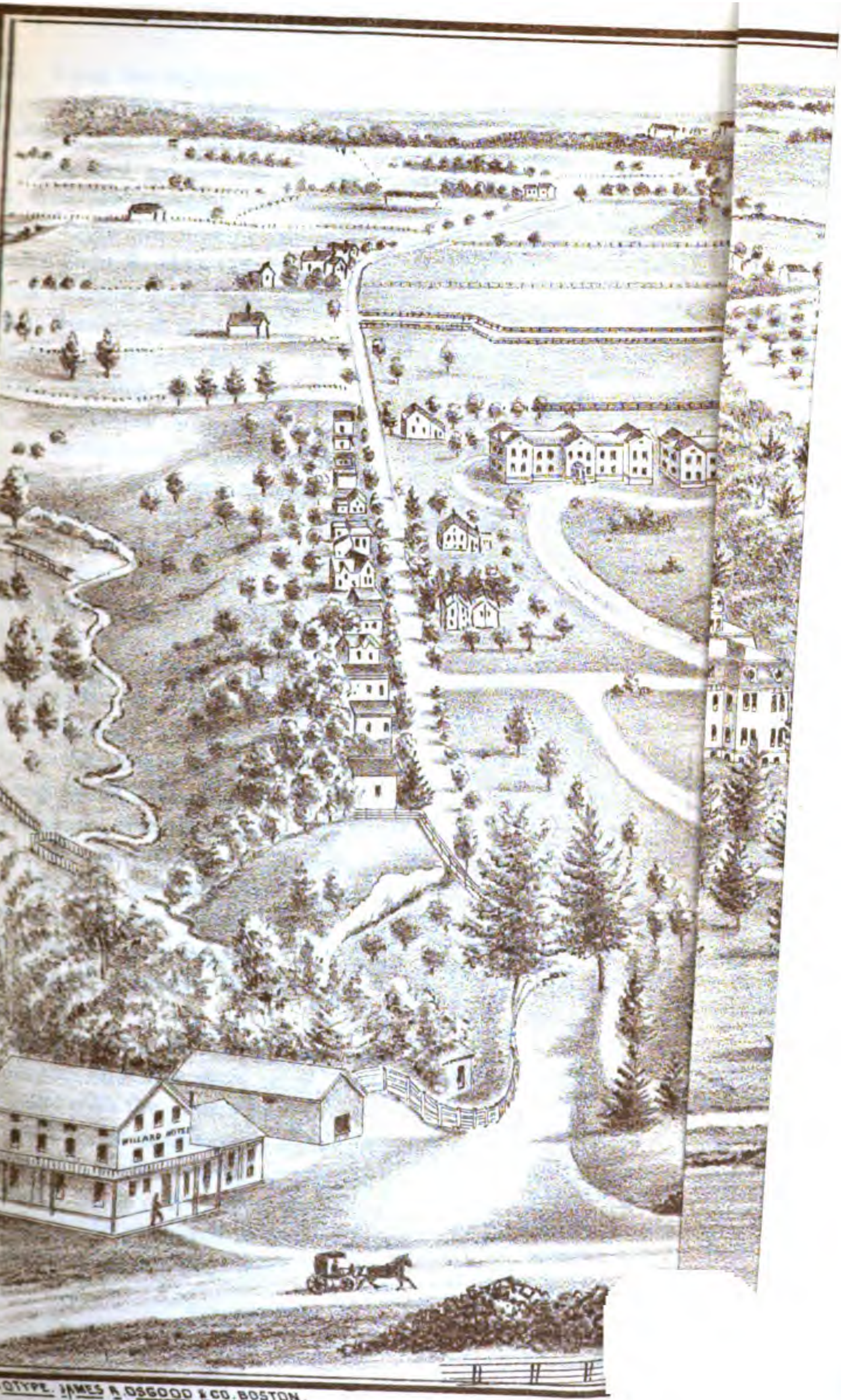
had been printed under this title, but were really not such.

countries to provide for this large and helpless c
erate cost; many plans and theories had been sug
Gheel system, with all its faults, had been rec
the village system of Scotland had been prais
ended in our building expensive asylums for a
and leaving the rest of the chronic insane to lea
lives in county receptacles. In many respects,
Chapin, the medical superintendent at Willard, ha
in solving this difficult problem better than ha
case elsewhere. Beside his central buildings, h
groups of brick cottages, each accommodating 2
and built at a cost of $100,000 each, or $500
The furniture cost $8,000 for each group. Th
advantage of using the common laundry, etc., an
necessary to buy land; but these additional exp
not amount to more than $50 per patient. The
visited by the writer, December 8, 1876, and foun
all that is necessary for the comfort of the pa
separation of them from one another, even to this
the effect of diminishing noise and excitement.
medical officer resides in the central building of e

The building, "A," was constructed for a scho
been adapted to the purposes of a separate dep
women. "B" is the workshop. The weekly co
taining each patient is a trifle less than three d
accompanying map is reproduced from Dr. Cha
kind permission.

In the same year, 1869, an important step w
Dr. John P. Gray of the New York State Asylu
Recognizing the great advances in knowledge,
mense field opened in all departments by the int
the microscope, he appointed a special pathologis
to make investigations in the morbid anatomy o
Dr. Gray's example was followed the year after
town, Conn., in the appointment of Dr. Edward
of New York as pathologist to the State Asylum.

In 1870, upon the recommendation of the sup
Dr. Bemis, the trustees of the Worcester Asylu
a woman as assistant physician in the female depa
experiment which was followed in the Maine Stat



OTYPE. JAMES R. OSGOOD & CO. BOSTON.

on the resignations of these two ladies, a few years
difficult to find thoroughly educated women, the
had not proved altogether satisfactory, and men
nted to the vacant places. But in the future,
are accomplished female physicians to fill such
ere are now in other branches of medicine, our
aim to have taken the step in advance.

nges have been made in old asylums; and the
nfort of the patients is more and more an object
from year to year. At Dr. Kirkbride's, in Phil-
during the past seven years, at one department
ladies' wing), for nine months of each year,
ever been a single evening in which there was not
of entertainment, occupation or amusement. . . .
npts to introduce mechanical occupations among
seemed to me quite successful enough to justify a
tension of them. . . . Whatever has banished a
m the mind of a patient for a single hour, has done
se value is not easily calculated."*

ssachusetts State Asylum at Northampton, in the
October, 1874, Dr. Earle reports that there were
-one days in which there was no gathering of the
the chapel for religious exercises, recitation, etc.
year, with a daily average of 469 patients, there
days' work done by them on the farm, in the
he sewing-room, and in the laundry.

cLean Asylum, several carriages are kept for the
se of the patients, and the pleasant rides and
constitute a large part of the treatment, while the
rary furnishes abundant material for that kind of

ont there is a book-case and library in nearly
y, and the daily gymnastic drill in a bright,
l, with the pretty costumes, adds an interest and
herwise monotonous afternoon. At this asylum,
th a daily average of 500 patients, there were
ks taken; 10,157 attendances at magic-lantern
16,558 at church, 4,327 at parties, 2,972 at other
nts; 2,984 rides; 3,928 calisthenic exercises [for

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* Report for 1875.

ladies] and 8,893 days of labor. In scientific wor
have shown "that colored light has no greater p
cure of insanity than colored water in the treatme
of the diseased stomach of an inebriate."

At the Retreat, in Hartford, a delightful amus
is open to the patients through the day, and is ofte
filled in the evening. Within a couple of years, t
has been built, through the munificence of friend
lum, a little way from the other buildings, and in e
like those for "sane" people. The daily evening
the Sunday exercises, with the walk in the open sp
patients a feeling of self-respect which they canno
constantly reminded of their infirmities by guard
everywhere and other indications of their depriva
dom.

Present Condition.

At the same time, in the words of one of our
guished alienists, the general "propositions (of t
Association of Superintendents) in regard to the
and organization of hospitals, and the general ma
the insane (in the United States), have all, or ne
stood the test of a quarter of a century's trial,
equivalent to saying that there has been little adv
time.

In construction and internal arrangement, the
can hospitals for the insane are not excelled
any part of the world, with the exceptions that
have insufficient provision for the employment
tion of the patients; that they have no hospita
nurses, where such patients as require them m
benefit of quiet, rest, and the care and attention
ordinary hospitals; and that the restrictions upo
of the inmates have not, in all cases diminishe
spond with our advance in knowledge and with in
in other parts of the world. These defects we
most of the countries on the continent of Europ

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[*] This is, so far as known, the first in this country (*i. e.*, the first l
nary life) although they are not uncommon elsewhere.

[†] It is interesting to compare this with the statement, in 1862, c
leader of the conservative party in Germany, that there is nothing
in the future to improve the public institutions for the care and cure

arrangements for "convenience of administration,"
ificence of their central or administrative buildings,
multiplicity of labor-saving machinery, where it is
find enough for the patients to do, the new Amer-
hospitals for the insane are absolutely without

half a dozen* of our States are now providing
r all their insane, the expensive buildings which
been thought necessary being absolutely beyond
of many of them.
ition of our worst asylums may be inferred from
for 1872 of one of our medical superintendents,
—

> ppropriate tabular statement accompanying this report,
> everal colored people reported as having died from
> s of disease. To have been strictly truthful, that report
> read, 'died from want of proper accommodations'; for I
> e their lives might have been saved, if I could have had
> acilities for their comfort and care at my command.
> nows the inefficacy of medical attention in the treat-
> ases, where the patients are confined to such miserable
> as are our colored patients."

a newly appointed superintendent in Texas found
airs, dark rooms, iron handcuffs, locked boxes,
hower- and plunge-baths in common use. He
necessary to state his opinion "that the infliction
ent for misconduct on the part of any patient is
of place." The records and journal were not to

chains were still used in the department for the
e almshouse at Baltimore.

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ctacles of human misery which the light of day looks upon, we sup-
lunatics in American almshouses is the most pitiable. Unlike many
the great evils of society, they are often persons who have been in
ances, and who must, in their dim way, feel and see the abuses of
In the country poorhouses, they are treated as lunatics were a
go in Europe. They are chained, put in cages, beaten, kept in dark
re, often naked, their food reached to them as to beasts, their clothes
l, without bedding, except straw, left in their own filth, and eaten by
horrible treatment was (till within three years) common in many of
is still the fact in the majority." [The Nation, No. 560, New York,

The city insane asylums of New York and Philac fitly described in 1875, by a distinguished Englis being a disgrace to our civilization.* He also f to our largest and wealthiest city, in one ward, " iron bars, strong enough to confine lions and menagerie." In some of our asylums, reputed t the best, there are still dismal corridors and gl which, however, will probably be altered as fas stances admit.

The Twenty Years' Leadership.

It is not difficult to see why our asylums for the better than those of England for about twenty ye tioned above.‡ Neither country had, in 1836, be medical disease clinically in the hospital and at t nor was it the custom in either to make careful examinations as a basis of study, as had been do half a century in Italy, France and German country had any association or inspecting officer the metropolitan district of London) to compare upon the progress of the different hospitals.

So far we were alike. Our great advantages (1) That the principle of supervision by the state o asylums had been adopted by us in 1818, while, England, state supervision, although more efficie did not begin until 1842; and (2) that we had number of old asylums, private and public, wit and usages of years to overcome. Everything new, and the pauper and otherwise helpless class beginning to accumulate.

MODERN METHODS OF LESS RESTRAIN

During the last twenty years or more, dating fr when the first insane asylum was built with woo large window-panes, and no iron guards, the Scotch asylums have advanced faster than any oth

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* These have been improved since that time; but there are many still worse.

† Notes on Asylums for the Insane in America. By John Charles F. R. S., F. R. C. P. London, 1876, page 53.

‡ See page 347.

le now stand at the head of the nations of the
e provision which they make for the care of the
accomplishing these desirable ends, they have
rtant advantages over us.

re is a careful and critical examination by experts*
ylum in the kingdoms at least once a year, from
c reports are published of the condition and prog-
various institutions, whereby local authorities are
ake adequate provision for their insane, and through
superintendent may compare his work with that of
see whether he falls behindhand in the race.

tal disease is taught clinically† at the bedside and
wards in every important medical school; careful
n examinations‡ are the rule and not the excep-
asylums, and, as a result, pathological investiga-
ore common than with us.

British Medico-Psychological Association, including
physicians interested in mental disease, whether
ents of asylums or not, in their yearly meetings,
broader view of the field than if participated in
endents alone.

still, however, in England and Scotland, enough
ich may well occupy the attention of their philan-
and, although there are many points in which
n from their best asylums to our advantage, Dr.
Lindsay has testified,§ after a visit to this
it, "so far from its being the case that we have
earn from the Americans in our treatment of the
ll, I think, have no difficulty in showing that in

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pond to the *inspecteurs des aliénés dans les établissements spéciaux*
teurs des asiles publiques d'aliénés of France. There are not yet any
rman Empire; but each state supervises its own insane, generally
vinzial-Verwaltungs-Rath, or under the direction of the *Ober-Präsident*
ngs Commission.

Browne's work, already referred to, called attention to the want of
on in mental disease, and it was then begun almost at once.

sioners say, in their twenty-fourth report: "With the all-important
ng the knowledge of the pathology and treatment of the various
y, we think that the practice of making post-mortem examinations
possible, be everywhere the rule, and not, as in many instances, the
ught also, in our opinion, to be applicable, under the same conditions
e part of the relatives, to all classes of patients." The proportion of
ns to the deaths rose from 40 per cent. in 1869 to 61 per cent. in 1873.

Medical Journal, December, 1870.

not a few important respects, they are decidedly of their own characteristic expressions) 'ahead.'"

There were in England in January, 1874,—

72	pauper insane asylums, averaging	456
5	asylums for the better classes, containing over .	200
4	" " " " "	from 150 to 200
7	" " " " "	" 100 to 150
7	" " " " "	" 75 to 100
9	" " " " "	" 50 to 75
29	" " " " "	" 25 to 50
80	" " " " "	less than 25

One of the most striking of the changes[*] broug rather commenced, is the individualizing of treatn separating of patients as much as possible fr influences, by the increase in the number of small a very wide departure having been made from taken by Dr. Bell a third of a century ago, that shows that the very highest curative advantages by the mutual action and attrition of diseased each other,"—a point upon which Griesinger says, is there greater need of strictly individual tre with the insane; nowhere must we more consta mind the fact that not a disease, but a diseased in insanity, but one who has become insane, is the o treatment"; and Roller, when speaking of tho from mental disease, states the principle more f "*Nur von unkundigen wird es bestritten dass das zu mit andern kranken*[‡] *die Heilung befördert*" (informed contend that congregation with other covery).[§]

A few of the asylums in England, of which was, I think, the first, have imitated the exan

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[*] These will be illustrated chiefly by letters which explain themselv best asylums, with their advantages in employment, personal free patients, have been described by Dr. H. B. Wilbur, superintend School at Syracuse, who visited Europe by request of Gov. Tilden 1875, in an interesting treatise on *The Management of the Insane i Albany*, 1876.

[†] Die Pathologie und Therapie der psychischen Krankheiten, Braunschweig, 1876, pp. 472 and 473.

[‡] This word *kranken* (the sick) is very commonly used now by G referring to the insane.

[§] Op. cit. p. 4.

tan hospitals in establishing summer resorts and con-
homes for their more quiet patients, so as to get
y from the asylum influences, and with the best

land,* there were in 1874, 8,069 insane under the
e commissioners. In 1858, there were estimated to
beside those known officially; but their present
which does not appear in the reports, is probably not
Of these 8,069, 4,717 were in seventeen royal and
sylums, 338 in eight private asylums, 748 in six
asylums, 565 in fifteen workhouses, and 1,650 in
vellings† and training schools.
four-fifths of those under the care of the officials, and
them, about 70 per cent. of the whole number,
efore in asylums and workhouses.
ing to the statistics and estimates of our Board of
rities, about 60 per cent. of all the insane in Massa-
re in public institutions, the preference being given
erer cases; so that the average degree of severity
in our asylums, as compared with those of Scot-
be roughly estimated as 70 to 60 or as 7 to 6, not
for any difference arising from nationality or char-
disease, if there be such.

Opinions and Letters.

cknill, after his long visit to this country, writes to
rd Jarvis, October 31, 1875: "You have no idea in
of the amount of freedom, under due supervision,
lunatics get; and it is constantly being increased,

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been little that is distinctive in the early history of the treatment of
at country. The Scotch laws placed the rich insane in the hands of
early as the thirteenth century; in modern times they have rather fol-
ecedent of England. The Commission in Lunacy was appointed in 1855.
arry us beyond our limits to fully describe this system of boarding out
families in the villages of Scotland. It is done at a cheap rate, and the
eported, many of them, at least, as liking it better than asylum life.
who has endeavored to find a boarding-place for a single one of them can
difficulty, and often impossibility, of finding in this country suitable
are willing to undertake such care and responsibility for strangers.
bjection, too, in placing a dependent class in the charge of such persons
to take them. The best account of this Scotch system, "*Ueber famil-*
e in Schottland," may be found in the Archiv f. Psychiatrie und Ner-
en, Vol. V., 1875, pp. 164–188. It has been said in England that these
ers are not always adequately looked after.

and with the best results. We are now pretty we
old superstitious fear of the insane; and, where th
insanity have been so much enlarged, it was ti
should be so."

Dr. Tuke and Dr. Fraser.

One of the most interesting experiments has be
Dr. Batty Tuke, and carried out by his successor,
whose letter, originally published in the Boston
Surgical Journal, is so full of suggestive matte
siderable part of it is given here. It should be s
asylum is quite in the country, and that the patient
of the quiet, agricultural class. Herbert Spence
this one of the most important steps of the day i
ment of mental disease. Undoubtedly it is su
would not be fair to infer that all asylums and al
in all places can be treated in this way.

Some of the windows open freely, others are
that neither sash can be lowered or raised enoug
the egress of a patient. The separate wards o
building are semi-detached and of only two stori
Dr. Fraser had described his autopsy- and micros
it would have been seen that he considers careful
research of the utmost importance.

The cost of this asylum, without furniture, was
than seven hundred dollars per patient.

"FIFE AND KINROSS DISTRICT LUNAT
"CUPAR, FIFE, SCOTLAND, January

"MY DEAR SIR:—I have the greatest possible pleas
ing to your request for a description of my asylum.

"It is the district or pauper asylum for the counties
Kinross. The population of the two counties is one
seventy thousand. The institution is capable of hold
dred and eighty inmates. The present numbers are
and ten males and one hundred and thirty-eight femal
two hundred and fifty altogether. The yearly admissi
eighty to ninety. There is one attendent for every twe
The patients are classified, and each class has its own
highest number in any gallery is twenty-four; the lowest,
female department has seven galleries, each complete in

ach of them has its own day-room, dormitory or dormi-
gle sleeping-rooms, lavatory and conveniences. Four
attendants, two only one. This divisional arrangement,
elieve it adds to the working expenses, admits, as I have
, of classification of the patients. The day-rooms or
ms for twenty-three patients are thirty feet long, twenty-
road, and eleven and a half feet high. The windows of
s are nine feet by seven feet, and the panes are twenty-
by eighteen. There are no window-panes smaller than
nes by ten and a half anywhere. The lower half of the
as brass rods three-eighths of an inch thick running trans-
oss the panes and through the woodwork of the window-
could wrench these rods out with my hands. There is no
as an iron bar across a window, and all our window-
of wood.

sk me for the features which distinguish my asylum. I
ese to be: 1st, unlocked doors; 2d, the great amount of
edom; and 3d, the large number on parole. In common
Argyllshire asylum, airing-courts are not in use. The
tion given to the occupation of the patients and the large
of those employed are characteristics of this asylum as
two others in Scotland.

as regards open doors. Here is a paragraph from my last
ort to the directors:—

h now to describe the peculiar feature of your asylum;
e open-door system. It was originated about three years
r former physician-superintendent, Dr. Tuke, and I have
ion in saying that the introduction of this system will
a in the history of the treatment of the insane. As you
are, there are no high boundary walls surrounding the
nd the entrance gates stand always open. To make this
clear as possible, let me suppose that a visitor calls and
see through the asylum. He is received at the front
h will be found open; he is then conducted through the
he male galleries, containing over ninety patients, and
the dining-hall, through five of the galleries in the female
containing over ninety patients, without *once* coming upon
loor. Not only is there this free communication inside
but the outer doors of the main ground corridors, which
n the terraces, are also unlocked. The male convalescent
hich contains from twenty to twenty-five patients, has its
from shortly after six A. M. till eight P. M. The inmates
rse, on parole. Two galleries in the female department
n under the old system of locked doors. Though not

necessary for the majority of their inmates, yet the err chievous tendencies, as well as the excitement of some in each division, render locked doors necessary. Gre ment is, I believe, the result of the innovation I have to; the sense of confinement, or in other words, of i of which even a lunatic is conscious, is absent. The a verted into a home and a hospital. A greater numb and accidents would *a priori* be expected from this stat The escapes have been nine in number, and there are o can be attributed to open doors. Four accidents, non port, except the suicide previously detailed, have oc the year, but none in any way attributable to this syst

"This bold advancement in the treatment of the in have said above, wholly due to Dr. Batty Tuke. It inal mind, to his enterprising spirit, to his confidence i afflicted humanity hitherto unconfided in, and to his adage, 'The more you trust, the more you may,' that t the life of the insane has been initiated. I must co my head when the doctor first proposed it, and our ma could not see 'how it would do at all.'

"The history of this movement is interesting. At deal of wandering about the house occurred, especia galleries to the kitchen. A number wandered outside, course attempted escape. Gradually the patients were they were to go out, and what parts of the house t mitted to visit. Those who escaped were spoken to i the others: they were informed of the inutility of esc certainty of their being brought back; that they mu the asylum until they were better; that every kindn shown them; that everything they had to say would attended to; that when the time came they would g front door, and that the doctor would be there to say wish them well. It was wonderful how the most deter ceased from attempting to escape. I could quote a where a remarkable change in this respect occurred intelligent escapers were taken to the doors, shown th and then informed that confidence was reposed in them was unproductive of any good, and that the way to g to show themselves worthy of trust. Not only wit residents did this state of imposed confidence have effect, but also with transfers from other asylums. F lady patient was admitted some time ago from ano The account sent was that she was most determined in at escape, that she had broken the framework of her loors in order to escape. Her habits were said to be vas a case of moral insanity, and the intelligence was lear. After admission, she was shown the open doors g out to the terrace within ten yards of her sitting-room), edom that existed. Confidence was preached to her, and ormed that good behavior of every kind was expected of now walks out daily on the terraces, unattended, whenes, yet there has never been the least attempt at escape. ver been dirty in her habits. This patient has been in Scotch asylums, and she says that this is not like an ll, that it is unlike any of the others she has been in, re she has no desire to run away.

xperience of the insane will cause you no doubt to say, nnot be treated in this wise.' I grant that, but what I oress upon you is the great number that can. You will wo departments on the female side under the old *régime*. npt was made to leave one of these off the lock, but the doings of three chronic maniacs, and the incurable of two or three demented and suicidal patients, preopen door from being persevered in. Excepting these, mbering from one to eighteen, would be all the better for ed doors. The other department is one of our new nd is separate. From its situation and its inhabitants, nic maniacs, it would be inexpedient to attempt the step

especially to describe our male convalescent building. e capable of holding thirty-three patients, but at present ly twenty-two resident there. Its doors are open every ven in the morning till eight and nine in the evening. s are all on parole. No one has broken his parole dur- two and a half years. An attendant and his wife have he place. They have a little child five years of age. down to meals together, the patients, the attendant, his ild. The latter two mix with the patients at all times. lso a step of Dr. Tuke's, and admirable have been the hen men associate only with each other, they are apt to coarseness, swearing, and fighting predominate; but nan is present, and especially when a sweet little girl h them, then swearing and angry passions cease; at has been the effect in this department of my asylum. two dormitories upstairs, one in which no attendant patients are left to themselves), and the other is in attendant who comes down from the main building for This place is our Gheel.

"I believe that the conditions above described, coupl
stant occupation, result in (1) greater contentment
happiness among the patients, (2) better conduct in ev
less excitement, (3) the preservation of the individua
patient, (4) less degradation, and (5) greater vigilance
the part of the attendants. As regards the fourth res
it to be strikingly true.

"Occupation is what I have the utmost confidence in.
are most beneficial. Almost every male patient can f
a barrow, and the majority can use a spade. So a
female patient can use a needle and thread or a kni
Constant supervision soon teaches one what is most sui
I beg to refer you to Sir James Coxe's report, which yo
the annual report which accompanies this letter. He
paragraph from my last annual report: 'Attention i
stantly and increasingly directed toward the occupa
sexes. At the present date, all male patients, with t
of from five to eight, are sent out every day in part
according to their capabilities for work. Attendants
each set of workers. The head and sick-room attend
only ones retained in the house. On the female side th
workrooms, one devoted to the main sewing requirer
house, and the others to the teaching and encouraging
the idle and demented. In these three rooms are a
patients. The laundry, the kitchen, and the house g
employment to about forty more, so that the actua
reduced to a minimum. My desire and aim are to make
a veritable beehive. The men work both forenoon an
but their hours are not long. The females, though kep
the forenoon, spend the afternoon in walking and out
tion. I am at present dispensing with the use of airin
I shall make no comments on this step until after a y
ence.'

"Airing-courts are a mistake, especially for females
ago I used to send out the demented, the chronic mani
idle to the airing-court of a morning. Of course, hav
useful to do there, they did mischief, quarrelling among
getting excited, and increasing their destructive habit
tients being safe within four walls, and out of sight, th
were heedless, habits and practices occurred which the
for the sake of decency and for the respect of their sex
been active and vigilant to prevent elsewhere. Those
go to the airing-court in the morning are now colle
tables and set to work at knitting, sewing, darning

ween the airing-court and this room is very striking. orning this workroom was quiet in the extreme. I them all, spoke to each, praised their doings, and en- idle, and there was not a word out of place. Had the airing-court they would have been squatting in all rampaging about, holding forth in loud tones, etc. nd the working together in the way described have a l inhibitory effect. The airing-court system permits propensity to run to weeds.

the present year there have been two or three cases aroxysms of great excitement. I have occasionally in the galleries when such outbursts have occurred, and itness of how the peace, quietude, and industry of the have been disturbed, and the excitable roused. Great ropensity is generally a feature of these attacks. In ne of two things must be done: the patient must either l by two or more attendants (the worst form of re- ut into seclusion. The former plan cannot be carried re is a minimum staff, but even had I sufficient at my believe seclusion to be the more beneficial mode of every way. There are cases,—at least this asylum ch,—in which great coarseness of language charac- aroxysms; and I maintain that such cases, in con- the feelings of the other inmates and attendants, temporary seclusion. Constant supervision of the determined me in this opinion. Restraint I have to.

ds the chronic harmless insane, I here subjoin another my report: ‘It is my opinion that many chronic luna- equire asylum treatment; they can be sufficiently cared led by their friends or others whom the proper authori- custodians. The chronic lunatic I refer to is one who trained to be cleanly, and perhaps industrious, whose tion may be described as that of a premature second nd of whose recovery no hope can be entertained. does not require constant medical supervision, the ex- rtenances of an asylum, nor the services of trained

ur Mitchell's book on the insane in private dwellings a most graphic account of what formerly existed and t the present day.

he foregoing remarks convey the information you de- hall be only too happy to answer any further inquiries h to make. If any of my professional brethren on

your side of the water desire to see this asylum, they
most willing cicerone.

"With best regards, I am, dear sir,

"Yours most truly,

"Jo

"Dr. CHARLES F. FOLSOM, Boston."

Dr. Clouston.

Dr. Clouston, well known in this country as th
of Dr. Skae at the Royal Edinburgh Asylum, fo
cal superintendent of the Cumberland and W
asylum, and co-editor with Dr. Maudsley of th
Mental Science, has begun an interesting work
side, a description of which is best given in his
In 1874, he wrote as follows :—

"*Memoranda as to the Treatment of Insanity, etc.,*
Edinburgh Asylum, Morningside, Edinburgh, by T.
M. D., Physician Superintendent.

"I have been now for fourteen years engaged in th
of the profession, and have paid much attention t
modes of treating the insane in this and other countri

"My practice in regard to patients, especially of th
is to allow them from the first, as much liberty as I
putting many of them on parole very soon, and tr
them feel that they are here really as invalids and no
Unquestionably, in those cases where I can thus trust
are happier and recover sooner than they otherwis
course, in some cases I cannot do so. Out of 77 p
higher class, over 30 are on parole, 22 of them living
pavilions where the arrangements are perfectly homeli

"Throughout the whole department for the high
substituting large plate-glass for small squares in the
am trying to remove all prison-like arrangements.
have gone yet, in the eighteen months since I came h
have been very good indeed on the patients, and we
accidents.

"I send a short description of the cottages, with
The main part of the house consists of three wards
and three for ladies, with a few private rooms and p
ward contains about eight patients, and in some case
the case of one ward one, attendant. There is a parl
open and lighted on one side, and with a row of bed

ıre building two new dining-rooms, chiefly of glass, to ıservatories, one for the gentlemen and one for the ve have already one very handsome dining-room for ıo pay over £105 a year. There is a large drawing-room dies and gentlemen meet in the morning for prayers, venings twice a week for cards, readings, dancing, etc. en have a billiard-room. All these public rooms are e those of a good house in their arrangements, the g the same way, etc.

as is practicable, I send my patients to walk and drive the asylum grounds, to town, to the museums, picture

that the first object of the institution is to cure as patients sent to it as possible, and to enable those who to lead as happy lives as possible, I deliberately run capes, and even in some cases of mild melancholia as with those objects. It is quite easy to arrange an ıat no escapes shall take place from it, but any such should pronounce to be radically faulty in its prin-

reatment of every case, it is of the utmost importance vhether the tendencies of the patient result from an hological condition of the brain, or from a curable dis-vorking. I should not put a general paralytic or a bad parole nearly so readily as a simple case of excitement n, though I have now mild cases of the two former parole.

believe that 'non-restraint' should be so elevated into ' that no departure from it is allowable. Diminish seclusion by all means to the utmost, but don't sacri-t's life, or the lives of those about him, to any such n practice, I have only used restraint once at night in one patient, for suicidal tendencies of the most aggra-and seclusion twice in a year and a half among my patients. I use seclusion rather more frequently among lass of patients, from having fewer attendants in pro-e number of patients.

in all cases that apply when we have room.

e much fewer windows broken now than when the panes e small and guarded by iron bars, and I think there is nent in regard to degradation and dirty habits in many class of patients.

nting, decoration and papering in the institution, I best and most tasteful tradesmen in Edinburgh.

“*Description of the Photographs of the Cottages, etc.,* *burgh Asylum, Morningside, Edinburgh.*

“No. 1* is the ladies’ ‘wing’ or pavilion, connected part of the ‘East House’ by a row of sleeping-rooms a The ‘East House’ is exclusively for private patients higher rates of board, and there is a corresponding win men. The wings contain eight rooms each, and usual date six patients. The gentlemen’s wing has a billiard- it. The arrangements of the wings are precisely simila private houses, the doors being unlocked, opening by th the outer doors (glass) open, and all the windows c large sheets of plate-glass. The patients in the wings separate from the rest of the house.

“No. 2, ‘The Cottage,’ for ladies, containing eight usually accommodating four or five patients. It ha room, drawing-room and bedrooms. All the arran those of a private house, unlocked doors, plate-glass w The cottage is situated about twenty yards from the as

“No. 3, ‘Myreside Cottage,’ for gentlemen, cont rooms, and accommodating five gentlemen, two attend and an assistant cook, who is an unpaid pauper pa situated at the extremity of the Royal Edinburgh As about a quarter of a mile from the asylum. Its arrang nothing supposed to be asylum-like about them.

“Altogether in these four buildings there are twenty- out of the entire number of seventy-seven high-class pa asylum.”

Two years later, Dr. Clouston writes as follows

“Royal Edinburgh Asylum for t
“Edinburgh, 28th Nov

“Dr. Folsom.

“My Dear Doctor:—I duly received yours of the assure you I am only too glad to answer any questions

“As regards any plate-glass experiments now univ East House for higher-class patients (containing ninety-t I have the greatest reason to be satisfied with them. O of glass has been broken in the two and one-half years th in, and that by an attendant in cleaning it. To show t in them, I may mention that in some cottage addition have lately built and occupied for twenty-four patie nothing but plate-glass, each pane filling up a sash,

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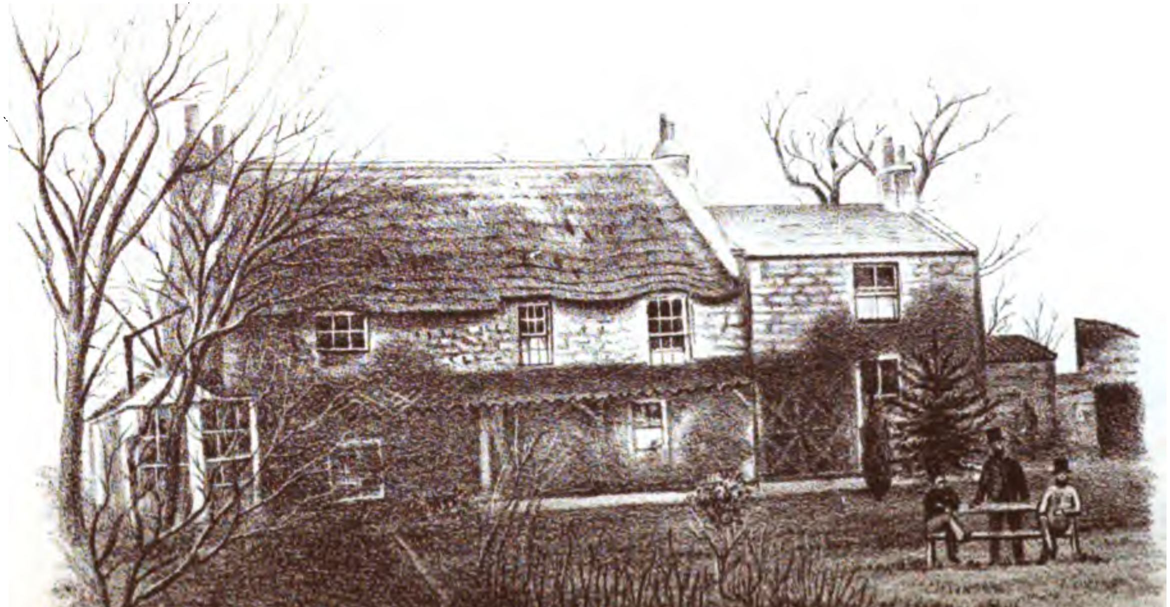
* Not shown in this place.



outer doors have all plate-glass panels, and that each parlor has such a door opening into the garden.

"I have followed some of my Scotch brethren, too, and have done away with airing-courts, so that now we have absolutely no such walled court of any kind at our East House or at the male division of the West House (these two containing four hundred patients). I am sure the general result has been very beneficial, though, in a few individual cases, we miss the courts.

"As regards plate-glass windows in the West House, we have fairly begun the experiment, having fitted up three galleries, containing one hundred and forty patients, with them, one gallery being on the ground floor, the next on the second, and the next on the third floor. They are immensely more cheerful, and no bad results have followed during the three months they have been in.

"I think in our asylums here we have too few attendants for our patients to individualize them properly, so I am gradually increasing our staff. We ought to have one attendant to eight for pauper patients and one to three* for private patients, in my opinion, to do them full justice. I am carrying out this without reference to the plate-glass windows or open doors in some wards, etc., but in accordance with what I think is required for proper treatment.

"The question that is bothering us most here now is that of disposing of our chronic, harmless cases.

"I am very truly yours,
"T. S. Clouston."

In Dr. Clouston's East House, the same class of patients and the same character of disease are treated as in our corporate asylums. The West House is for non-paying patients.

It cannot be said that Dr. Clouston has a mild form of disease to treat; for, by his last report, it may be seen that, of 310 patients admitted in 1875, 60 had attempted and 31 others had meditated attempting suicide. Dr. Butler, formerly superintendent at the Retreat in Hartford, thought, after visiting Europe, that the form and degree of severity of insanity in the Scotch and in New Englanders are about the same, although milder in the English.

Sir James Coxe.

The following letter from Sir James Coxe of the Lunacy Commission of Scotland, gives a fair idea of the general treatment of the insane at the present time in Scotland :—

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* This is about the proportion at the McLean Asylum.

“ General Board of L
“ Edinburgh, Janu

“ Dear Sir :—I have the honor to acknowledge r
communication of the 4th inst., requesting informati
points in connection with the management of the in
land.

“ I have much pleasure in replying to your ques
shall do in the order you put them.

“ It is the desire of the board of lunacy, that indiv
shall not accommodate more than 300 patients. It i
possible to keep them within this limit, as they are
tricts and must be enlarged when demands are made
accommodation. At present three of the district asy
for less than 100 patients; others accommodate fron
and others again exceed 300. The older asylums
erected from legacies and charitable contributions, a
serve the purpose of district asylums without bei
management of district boards, accommodate from
patients.

“ In none of the newer asylums are the windows fit
on the contrary, the window-sashes are of the ordin
tion, the frames being of wood and the panes frequent
to permit readily of the passage of the body of a
only precaution taken is to restrict the opening capaci
to a space of about 5 or 6 inches, and, when the pan
usual size, to pass a brass rod through the astragals
face of the glass.

“ The commissioners look upon asylums merely
arrangements for the disposal of patients. They att
peutic value to the agglomeration of the insane; an
the question of economy, would prefer to see them
in groups of such a size as would ensure every
individualized.

“ It is the object of the commissioners to facilitat
of harmless and incurable patients from asylums and
them in private dwellings. Curative treatment in pri
they regard as surrounded by too many difficulties to
countenance. As a rule, the chronic patients removed
are not concentrated in special villages, but are sent
parishes to live with friends. Occasionally, howeve
ishes, such as those of Edinburgh and Glasgow, reso
tice of placing their incurable patients in certain
communities of 10 to 50. This practice, however,

Heliotype.

James R. Osgood & Co.

from the difficulty of procuring suitable accommodation in towns. It has been found to give satisfactory results. Not more than four patients are allowed to be received into any one house, but the actual number rarely exceeds one or two.

"There is a growing difficulty in procuring and retaining the services of trustworthy persons of either sex as attendants, a difficulty which is owing to the increased facilities which the prosperous condition of the country affords in obtaining employment in almost every capacity.

"Our experience is, that in proportion as the restrictions on liberty are relaxed, the more easy does the management of asylums become. A movement to abolish walled airing-courts has already acquired considerable development, and, in addition to this, the experiment is being tried of doing away altogether with locked doors, except in one limited portion of the establishment.

"As a rule, mechanical restraint is entirely abolished in Scotch asylums, except in the department of criminal lunatics in the central prison at Perth, where one or two patients are generally found with one or both hands restrained as a protection against impulsive violence. Occasionally, in ordinary asylums, a patient may be found wearing a strait-waistcoat to guard against sudden outbursts of violence, or to prevent his injuring himself, but, as a rule, mechanical restraint will not be met with in more than one or two instances in making the whole round of our asylums.

"Trusting you will find that my answers to the questions you have asked will give you the desired information,

"I am, my dear sir,

"Yours very truly,

"JAMES COXE.

"DR. CHAS. F. FOLSOM, *Sec'y of the State Board of Health, Boston, Mass.*"

The accompanying photograph of a portion of the Montrose Asylum, gives a fair idea of some of the later accommodations for the more quiet of the insane who pay either nothing or low rates of board.

Dr. Rogers.

The next two letters, from a physician of large experience and eminence in the treatment of mental disease, sufficiently explain themselves.

"COUNTY ASYLUM,
"RAINHILL NEAR PRESCOT, January 18, 1875.

"MY DEAR SIR:—This asylum, as originally built, was in blocks, three on each side, connected with covered passages, two wards in each block, one above the other, and the largest ward capacity for 34 patients. With the great demand f accommodation, two new blocks were built, three storie ing bedrooms on first and second floors and none on floor. These blocks contain 124 patients each.

"It is obvious that the same amount of supervision vidual attention cannot be bestowed on each patient i wards as in the smaller ones, and therefore they are c geous where a large proportion of the patients are c and fairly tranquil and orderly.

"A similar arrangement of large sleeping-rooms ha over the laundry, but this is objectionable, in my I would prefer that the laundry should be untenanted, e the daytime.

"There never were bars to our windows, which ar same size, both for the quieter wards and those for th of patients. Locked fire-guards were originally in u have been removed for twenty years. A former su even had all the Venetian blinds removed from the wi have replaced many of these for convenience and comf

"With regard to the number of windows broken, th great deal on the propensities of individual patients. the propensity is only transitory; with others, perman now an inveterate window breaker—a woman. The thing occurs in the ward to call off the attendant's takes the opportunity to break as many windows as one month she broke 80. Her object is to get put where she is happy. I should not think of using res case, as a principle, if it be worth anything, is worth few panes of glass; besides, the tendency to windo generally due to some condition of health which may by treatment—most frequently a weak state of health ment. This is not so in the case quoted, who, althou cal patient, is at present in very good health.

"I am decidedly of opinion that the use of restr confirm and strengthen degraded and animal instin treating the insane as rational beings has the tenden self-restraint and decency.

"That this result is often very long in being produ in some patients never is produced, is no argument aga eral rule, and I hold most decidedly the opinion that patients so degraded in habits but that they are s humanizing influences, provided there is no progres brain disease present.

"I might add a few words on the subject of attendants. This is a fruitful source of complaint amongst English physicians and superintendents, and of late I have found the difficulty of securing and retaining the services of good attendants greater than ever before.

"I attribute this partly to the hostile feeling which exists, and which constantly tends to break out amongst the superficially educated, on the subject of asylum management, which was illustrated by sensational articles in many of the public papers (medical included) a few years ago. These had, as it appears to me, the effect of making present attendants shirk their responsibility and seek their own interests rather than that of their patients, and of preventing eligible men and women from undertaking an employment which was so calumniated. The great increase of wages throughout this country has, of course, also tended to make employment more easily obtained, as well as the shortening of the hours of labor to contrast unfavorably with the hours of an attendant's duty. But of one thing I am convinced, that a mere advance of wages will, even if it induce a better class to undertake the duty, not ensure its being better performed. What is wanted is a training institution similar to what we have in London and Liverpool for hospital nurses, provided by Miss Nightingale.

"Yours sincerely,

"T. L. ROGERS.

"DR. CHAS. F. FOLSOM."

"COUNTY ASYLUM,
"RAINHILL NEAR PRESCOT, December 1, 1876.

"DEAR DR. FOLSOM:—Our English county asylums are visited once a year by the commissioners in lunacy,—*i. e.*, by two members of that Board, a medical man and a legal member,—and every two months by two or more members of the committee of visiting justices. These are all the statutory visitations, and the rules for visiting made by local committees vary greatly, from weekly visitations, as in Middlesex, to quarterly, as in Yorkshire.

"Here, we used to have a rule that a magistrate should visit between each monthly meeting of the committee, but that has not been observed now for years, and only the statutory visitations are made. . . .

"I object strongly to any set of men arrogating to themselves the right to determine how another set should treat any kind of disease, and, although I certainly am of opinion that our system of treatment of insanity is better than yours, I have no right or wish to assume that yours is incapable of being defended.

"By the way, Dr. —— of —— visited this asylu ago with an introduction from your consul in Live unfortunately away from home, but my deputy inform had particularly wished to see the implements of seemed incredulous when informed there were none in ment; and this seems, from what I read and hear, to ing feeling in America; viz., that we do not really professions. If this were so, it would be far worse (eyes) than an open use of restraint. If, however, yo would take the trouble to make inquiries, either thro suls, or, still better, by personal examination of our I am certain they would always be gladly wel could satisfy themselves how far the system of non actually in force in England at the present time. went rather fully into the subject in my presidential ad a copy of which I believe I sent you, I will not give edition of it here.

"I am yours sincerely,

"T. I

The following notes by the writer in regard t Villa, near Liverpool, and the West Riding Asyl field, England, illustrate some points which may here:—

*Tue Brook Villa.**

"Reaching Liverpool, and not having much time I at once called on Dr. Owen at his private asylum for of mental diseases. When I went to see him two thought that by mistake I had strayed into some private grounds. The gate was swung wide open, th fence in sight over which I could not have easily vault tal in the distance had an attractive, home-like l well-trimmed hedges and newly mown lawn looked picturesque with the herd of Ayrshires and occasio men and women here and there. As I got nearer, I faces of the people unmistakable evidences of me Some were strolling about, or sitting under trees, e on parole, that is, having the liberty of the grounds, they kept within certain limits. In other cases, c looked after a group of cases or a single patient, acc severity of the illness. Inside the hospital the ple rooms with their cheerful open fires (which are really not an atom more dangerous than gas-burners, sharply-pointed scissors, knives and forks, and steep stairways) had a quieting influence which is not got from opium or chloral. Those of the fifty patients who could control themselves sufficiently dined with the doctor's family, a privilege which they appreciated highly, and to gain which they exercised a great deal of self-control. This daily stimulus to their self-respect had a really wonderful effect; and as I sat at the table conversing with one after another, the windows wide enough open to throw out a wheelbarrow, and the doors all unlocked, I had time to prepare myself for Dr. Owen's statement, based upon an experience of over twenty years, that in building a new asylum he would have only such doors and windows and fences as are found in a gentleman's private house and grounds.

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* Boston Medical and Surgical Journal, August 26, 18

"Dr. Owen has one assistant physician and twenty-five attendants, whom he can employ in case of necessity, although so many are not always needed; that is, he treats individuals, and not wards or galleries."

West Riding Asylum.[*]

"Having a few hours to spare, a few day ago, while waiting for my train, I made an unannounced visit to the West Riding Lunatic Asylum, from which we have seen so many excellent papers in the medical journals, and whose yearly reports are so interesting and valuable to us. I was fortunate enough to find Dr. Browne at home, and was received with that cordial hospitality which I find so freely extended here to strangers. I have not seen an asylum, and I doubt whether there is one, where the modern treatment of mental disease is so well carried out in all respects as there. The directors pay a large salary so as to secure talent of the first order, and then leave the management of the asylum in all its details to their medical officers. The newer parts of the building were constructed with wooden sashes, and no iron guards of any kind were used. In some of the wards the panes of glass were so large that a patient might easily get out by breaking the glass, if no one were at hand to prevent it. Dr. Browne said that if he were now to construct the whole asylum anew, he should have all the windows made in this way. Even the 'refractory' wards have open fire-places, porcelain vases on the mantel-pieces, prettily decorated walls and nice furniture.

"Of the fourteen hundred patients, not one was undergoing mechanical restraint in any form, and not one was in seclusion.

"Dr. Browne does not even use clothes of indestructible material

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[*] Boston Medical and Surgical Journal, September 9, 1875.

for his violent and "tearing" patients, preferring to hav
ant close at hand until the destructive tendency has give
medical treatment and occupation. There were no a
in the old sense of the word; that is, bare yards with
but every patient who went out to walk did so in pleasar
decorated yards. I could not but admire the skill an
with which the older parts of the asylum had been ma
light and airy. At the end of one rather dark ward, a pl
from several gas-burners shone through a beautiful s
window during the day. One great secret of the quiet
which prevailed was, I think, the fact that all the patier
employed as far as possible. Even the carpets, shoe
cloth, clothes, etc., used in the place were made by the
found some old, demented men darning stockings. So
were even blacksmiths. About one-fourth are taught
their several occupations after entering the asylum.

"Of course, Dr. Browne has a large staff of competent
one to every eight patients; these attendants are carefu
in the first place, and all unfitted for the work are
weeded out. The suicidal patients are watched day and
cannot even go to the bath-room without an attendan
know what good pathological work is done at this asyl
not describe that department. As an illustration of the
is used to keep the patients from disagreeable sights, I
the two dead-rooms (one for the males and one for f
been so placed that the hearse coming or going, could
be seen. Many little things like that all over the asyl
how fully the old theory had been abandoned, that the
indifferent to their surroundings. In fact, a great deal w
in the way of treatment from making them as comf
happy as possible. A few minutes' walk from the war
Gothic church stands out among the trees, to which the
with a feeling of self-respect; and there is nothing in it
which makes it look different from a church for sane peo

"I have not space to describe the department for expe
medical and pathological research. I am sorry to pa
strictly medical treatment with simply a mention of th
baths and vapor baths (a very important feature) and
only a very few patients, comparatively, were taking me
more than five per cent. taking morphia in any form).

"I was very much struck with the good behavior of
and with the absence of noise and violence. I suspe
whole treatment which has been so successful may be
Dr. Browne's remark to me: 'Treat them as men and

they will behave as such.' I placed the aphorism alongside of my Scotch friend's reply to my inquiry what his treatment was that made his patients so quiet, for I saw many open doors, large wooden window-sashes, no mechanical restraint, and very few prescriptions in the medicine-book. That reply was, 'I believe in a good cook and a big garden.'

"It seems to be generally believed in our country that insanity is of a milder type in England, and that the insane are more easily managed. Of course I cannot say that such is not the case. I can only say that it does not seem to me to be true, and that I am supported in my opinion by careful and competent observers. But the English and Scotch have a great advantage over us in a climate which makes it possible to send their patients out-of-doors to walk or to work nearly every day throughout the year."

Prof. Westphal.

Prof. Westphal, the distinguished successor of Griesinger as superintendent of the department for the insane of Charity Hospital in Berlin, and professor of diseases of the mind and nervous system in the university, writes of Germany thus :—

"BERLIN, October 18, 1876.

"DEAR SIR :—I am very glad to answer your questions as far as I am able.

"The English no-restraint system is, to my knowledge, carried out in Germany at Hamburg, Halle, Göttingen, Charité [Berlin], Hall (Tyrol), Heppenheim, Neustadt, Eburwalde. Of private asylums, I would mention Dr. Mendel's and Dr. Levinstein's in Berlin. It is possible that there are still other German asylums with no restraint, of which I am not aware that they have carried out that system; but there are certainly not many, and it can still be said now that the greatest number use mechanical restraint, even those that are readily acknowledged to be model asylums, as for instance at Illenau in Baden. On the other hand, the no-restraint system is extensively carried out in German Switzerland.

"Window-guards have never yet, to my knowledge, been removed from any German asylum, but I know of one in Denmark, at Roeskilde (on the island of Zealand) in which there are no guarded windows.

"A new insane asylum has not yet been built in Berlin, and the city has lately given up the land which had been bought for that purpose. My advice has not yet been asked; but I should recommend the purchase of a large piece of land to be cultivated by the insane; a small central building should be constru greatest part of the patients should be lodged in se constructed buildings. Such a plan is now being carr province of Saxony, the land having been already bou

"The no-restraint system was first practised in Ger Ludwig Meyer, in the department for the insane of Hospital in 1862—the new asylum (Friedrichsberg) built. Griesinger introduced it in the Charity Hospi in 1866; but the system has been fully carried out on ruary, 1867. There have been since that time no cam the department of the insane of the Charity Hospita the Archiv für Psychiatrie und Nervenkrankheiten, V

"I am myself thoroughly convinced that the no-res is the correct one (*das richtige*), and have never ha depart from it.

"I think, too, that the guards may be removed fron provided certain patients (*kranke*) have their rooms floor; for the greatest number of the patients, in my are no window-guards needed.

"Hoping these few notes may serve your purpose,

"I am very respectfully you

"Ch.

Under date of January 6, 1877, Prof. West me that a part of the asylum at Hamburg is with guards, and that the new asylum at Marbu wholly so.

Munich.

At Munich some interesting work is done, as following description: *—

"The director has recently had one million gulde without a dissenting voice, for enlarging and improvin fying his buildings and grounds. In all his window guarded now) he is putting panes of plate-glass about thick; it cannot be broken by any ordinary blow. I not break it with my fist. Each pane costs a gulder gance which the *Geheimrath* from Hildesheim said th seen even in England.

"Another excellent idea which I noted was the bui rooms for exercise during stormy weather. The were almost wholly of glass, and the rooms were not to be heated. The sashes are to be taken out during summer, and the space occupied with plants, shrubs, etc. The superintendent is carrying rather far the principle of decorating the grounds and frescoing the wards and other rooms which are for the most demented patients; but he thinks his experience justifies him in saying that by such means he reduces his number of filthy patients 75 per cent."

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* Boston Medical and Surgical Journal, October 14, 1

Dr. Stearns.

Dr. Stearns, the accomplished superintendent of the corporate asylum at Hartford, gives this interesting account of his experience of British asylums. It is an important fact that his use of the non-restraint system for the past year has fully satisfied him of its merits:—

"Retreat for the Insane,
"Hartford, Conn., May 23, 1876.

"My Dear Doctor:—You may perhaps be interested to know that I visited Dr. Fraser's institution two years ago and spent a day with him. Of course I need not say that I was greatly interested. No one could fail to be so, with one having the enthusiasm he appeared to have in his work, especially as it extended quite as much to his pathological investigations as to the conduct of the other branches of his labor. The system of unlocked doors he explained to me, and judging by his letter to you the subject has increased in interest with him. I, however, felt then and do now that it is entirely impracticable with us, for reasons which I have not time to mention and which doubtless have occurred to your own mind.

"While abroad, I was specially impressed with the following points connected with the management of their asylums: 1. Occupation. 2. Non-restraint (so called). 3. Personal freedom. 4. Pathological investigations. I refer particularly to the Scotch asylums. It appeared to be the aim of the commissioners to stimulate activity in these directions, specially in those institutions where the superintendent had the requisite qualifications therefor. And here I think the beneficial influence of the system of commissions was specially apparent,—by counsel, advice, etc., helping the superintendents a little out of the beaten track and into new fields. I may say, in reference to the system itself, I think no one who saw the wonderful effects arising from the appointment of medical inspectors in the army during the late war could doubt the beneficial effect of a commission of lunacy. The trouble, however, in this

country is to obtain one properly constituted. If the N
States would combine and appoint men of acknowledg
in the specialty, who should devote their whole time
and clothe them with the requisite power, it seems t
commission would commend itself both to the public
institutions, and great good might come from it. . .

"Very truly yours, H. P.

Dr. McFarland.

Dr. Andrew McFarland of Illinois, a gentlem
years' experience as superintendent of insane asy
of our States, sums up his experience in 1876 in th

"We adapt our hospitals to the easy visitation of ph
convenient administration of medicines, sacrificing, by
easy and most desirable freedom of action in the p
ought to be hampered as little as possible.

"Another of our inherited ideas, equally vicious,
insane man is necessarily a 'jail-breaker,' and thus str
struction is to be the universal feature of buildings
My later experience with the insane has much disabu
mind on this subject. The number who cheerfully and
accept an asylum on the true principle as a fixed home
they are not tempted to stray, very much surprises me
of means of restraint is, I am satisfied, a frequent t
break over them. I believe that more of the insane
credit for have a consciousness that they need a speci
the outer world is no place for them, and, if such hom
vided on the true principle of governing diseased minds
become more completely attached to them than we a
pose in an experience of structures built to hold them in
force."

Less-Restraint Methods Considered.

These opinions of men of large experience in th
of mental disease, and of eminence in their pro
not quoted as indicating any arbitrary rules wh
always be carried out under all circumstances, but
what a different light many of the first authoritie
upon mental disease as compared with the views
twenty years ago. It is, moreover, evident, that
century the treatment of the insane has become a
and less that of restraint.

The climate of England is such that the patients may get out of doors nearly every day in the year, and that is considered by English specialists one of the most important features in their treatment; but in Germany the heat of summer is as intense and the winters are nearly as severe as with us.

It is not possible to prove by statistics that a larger number of cures can be got by this treatment. It certainly is reasonable that such should be the case; and it is thought by Dr. Clouston and others that more and speedier recoveries are the result. It is certain that there is no decrease of recoveries and no real additional danger to the patients or to the community, whereas the comfort and happiness given to a large and unfortunate class more than compensate for the added feeling of responsibility and possibly anxiety on the part of the doctors, and for the increased watchfulness on the part of attendants.

There are in most insane asylums patients so violent that all risks with regard to them should be assumed very cautiously; others so absorbed in their own delusions as to scarcely notice their surroundings; others too demented to perceive them; others still, too ill to do so, and a certain number who, well or ill, are indifferent or superior to their associations. Granting all this, and, for the sake of the argument, that our insanity is more intense than that observed elsewhere, we still have a large class who are not "furiously mad," who are thought to be best treated away from home and in an asylum, and who need everything in the scale turned in their favor in their struggle with a powerful disease. Often with a diseased will and weakened powers of self-control, they need every strengthening help possible. For them, the influences of multiplied restrictions and the inability to exercise what feeling of responsibility they have left, act simply as so many depressing forces. In their case, it is often really the safest to run some risk; and, in trying to be too safe, we should not infrequently, like an over-cautious surgeon, lose our only chance of ultimate success.

In reference to this well-known fact, the late Dr. Bell said, in his report for 1853 (page 26):—

"It is said that the admission among the early inmates of this institution of one of extraordinary propensities and capacities of

breaking out of any place of confinement involved a u
of thousands of dollars. It was naturally reasoned t
the first hundred admissions was included a man so d
violent as to render his certain detention an indispensa
who was yet capable of making his way through all or
cles, others of the same character would now and the
entire building was erected predicated on such a poss
parallel case has since [in 35 years] *been received.*"

Management and Curability.

It is the almost universal testimony that mental
been more easily managed in England by the les
treatment of it, and that the asylums have bec
and more orderly. An illustration of this gene
has been so recently shown in one of our own as
short account of it is given here.

In 1874, one of the county asylums in Illino
to have six out of its three hundred patients han
chained to chairs or walls. Their actions seem
stories of sights in Bedlam and St. Luke a half-
and which the writer had thought were not to be
days. On representing the matter to the physici
geons of Chicago, they made an examination and
a result of which the whole evil was corrected and
has been much improved in every way. One of
physicians writes, November, 1876, as follows
the insane asylum on Friday and examined ever
fully. I wish you could have been there with m
not seem at all like the institution we visited
years ago. I remarked to the physician in charg
not see any patients handcuffed or fastened to
wall." Of the result of removing the chains an
he writes: "The change was noted inside of tw
and the patients who had been chained to their
no more noise than the others; the superintende
he had not used them (handcuffs, etc.) since th
you were there. You said they would behave w
they were treated well."

Another striking case is the experience of
Conrad, superintendent of the Maryland Hospita

sane.* In May, 1876, he put in practice the system of occupation for his patients; and, from then until October 31, there were 2,724 days of work with less than 200 persons, not including many times when they worked for only a few hours. With a view of extending his experiment, Dr. Conrad purposes buying shoemakers and tailors' tools, and those of other mechanical work. He says: "The amount of work done is really astonishing, and many patients have engaged in outdoor occupation *who were never before outside the walls of the hospital since they came within them.*" As a result, he speaks of his ability to very much reduce the amount of mechanical restraint used, "owing, doubtless, to the greater liberty that we have granted the patients, and also to the restraining influences of the system of occupation which we have adopted. There can be no doubt of the fact that with the insane, as with the sane, the more confidence you use the better." He recommends smaller and separate buildings for purposes of classification.

If our asylums were relieved of their overcrowded condition, and if Dr. Conrad's example, carried out indeed for many years at our state asylum in Northampton by Dr. Earle, were generally followed, might we not hear less of an "American type of insanity" distinguished by greater severity, more violent excitement, more desperate melancholy, etc.?

In the report of the Connecticut Hospital for the Insane, for 1876, Dr. Shew says:—

"In former reports I have alluded to various means employed to divert, amuse and occupy such of our patients as were not in a condition to engage in outdoor labor. Besides our regular entertainments of music, dancing, concerts, lectures, stereopticon exhibitions, readings, etc., which occupy four evenings each week, our male patients have found pleasure and profit in a systematic course of outdoor military drilling, which was conceived as a valuable training exercise for insane men, and has been carried into useful practice by our worthy supervisor, Col. Thayer. So far as I am aware, this is a new feature in hospital management. Early in the season walking parties were formed of from ten to fifty persons, who would leave the grounds and spend an hour or two, and sometimes a whole afternoon, in roaming about the hills, gathering flowers or picking berries. As the season advanced, Col. Thayer gradually and almost imperceptibly formed those from the different wards into distinct companies, officered by their respective attendants. These companies would go out daily and practise at military evolutions. I am free to confess my surprise at the proficiency attained by many of the chronic insane, who had been turbulent, restless and noisy, or listless, desponding, and partially demented. These exercises were practised one or two hours daily by about 150. It should be borne in mind that these companies were formed of men who were not considered available for farm labor, or, in other words, of that large class of epileptic, maniacal, and demented patients found in every hospital who spend their time in the airing-courts or in the wards.

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* Report for 1876.

"About forty per cent. of all the men are regularly employed on the farm and grounds. One of the results of this form of military exercise and discipline was a steady increase in the number of those who were able to be employed on the farm, so that on pleasant days not more than half a dozen men, out of a total of 230, would be inside the building. Another pleasant effect of this form of amusement and exercise was observable in the quietness and order which prevailed in the house. The universal quietness at night was equally noticeable. Rarely was a sleeping dose of sedative medicine required; and from records accurately kept, I am able to report the absence, for weeks at a time, of all forms of mechanical restraint."

Position of English and European Experts.

It is not universally agreed, even in England, that mechanical restraint should be abolished entirely. Dr. Edgar Sheppard, Medical Superintendent of the Male Department at Colney Hatch and Professor of Psychological Medicine in King's College, London, says of his own practice:—

"Mechanical restraint is resorted to whenever it is thought necessary for the protection of the patient; but it is only necessary in rare and exceptional cases.* I believe its use to be neglected in many asylums to the detriment of the patients. All the windows in Colney Hatch are barred;† but there is no occasion for so prison-like an arrangement. English asylums have improved greatly since less restraint has been used, because of general attention being directed to their once neglected condition; because of legislative enactments, better supervision, etc. Restraint was formerly resorted to in all cases to save trouble, and so it became wholesale neglect;

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* This was Conolly's position.

† Like our asylum windows.

now it is resorted to in a few cases, and then only as the best means of treatment."*

Dr. Sheppard's high position, and his experience and ability, entitle his opinions to great weight. By the reports of the Lunacy Commission for 1871, 1872, 1873 and 1875, it is found that less than one per cent. of his patients (averaging 829 each year) wore mechanical restraint for those years,—much less of course than one per cent. at any given time,—and more than half of these were for surgical reasons; although a very different interpretation of the meaning of those who agree with Dr. Sheppard is usually made in this country.

Dr. Yellowlees, a well-known writer on psychology, formerly physician-superintendent of the Glamorgan County Asylum, and now of the Royal Glasgow Asylum, says:†—

> "I never hesitate to use restraint when other means fail, if I think it for the patient's good. The cases requiring it are very rare; but it is as certainly right to use it when required as it is wrong to use it when unnecessary. To condemn restraint under all circumstances merely because it has been or might yet be abused, is as unreasonable as to forbid all use of stimulants because they have been or may yet be used too freely. Unnecessary restraint cannot be too freely condemned; but to reject its use when necessary for the patient's welfare is to sacrifice the patient to a sentiment, and to degrade 'non-restraint' from the expression of a great principle into the tyranny of a mere name."

A striking instance of the extent to which the non-restraint treatment has been raised to a principle in England, may be seen in the Criminal Lunatic Asylum at Broadmoor, of which we learn that in 1875, the daily average number resident was 503, of whom 204 had been sent there for murder and 110 for "attempt to murder, maim," etc., and yet "no form of mechanical restraint was used in any part of the asylum during the year." With all this, "there were no instances of the commission of premeditated acts of violence, and no attempt to escape was even partially successful." There was only one suicide during the year, and no accident which could have been prevented by the use of mechanical restraint.‡

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* Dr. Sheppard's views are given at length in his Lectures on Madness, London, 1873.

† Asylum Notes, Edinburgh, 1873, page 13.

‡ Annual Report for 1875, by W. Orange, M. D., Superintendent. London, 1876.

As to the extent of the use of mechanical restraint in England, Mr. James Wilkes of the Lunacy Commission writes, under date of January 25, 1875, that it "is now very rarely employed in public or private asylums, and in many it is never used."

As to the amount of such restraint, where it is used, the commissioners, in 1873, when commenting on the fact that in 800 patients treated in one year at a certain asylum, ten different individuals had worn restraint at different times during the year, say that such an amount of mechanical restraint was without parallel at that time in England.

As to the character of the restraining means used, Dr. Yellowlees says: *—

> "I have only two appliances for this purpose, which it seems absurd to call instruments of restraint,—canvas gloves which envelop the whole hand; and a jacket such as that worn by all the patients, but of stronger material, and with the ends of the sleeves sewed to the pockets."

The benefits of the change in practice in England are well expressed in Dr. Sheppard's letter.† The position of the superintendents themselves is well represented by the following extracts from letters from two of their leading men:—

> (1.) "Restraint in England has a strictly technical meaning, and means a restriction of personal liberty by some mechanical appliance attached to the person; as a camisole, locked gloves, etc. In this sense I have no experience of restraint whatever. I believe I have seen cases that might, perhaps, have been benefited by it. I have never, however, had recourse to it, perhaps from a weak-minded fear of the name; but I believe because I objected to its moral effect on the other patients, on attendants, and even on myself." ‡
>
> (2.) "Some superintendents in this country have adopted the extreme view, that restraint should *never* be used; for, even if a benefit to one special case, its introduction might lead to great injury in other cases. I think this view false in principle and wrong in

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* Op. cit., page 11.

† See page 386.

‡ Judging from the extensive correspondence printed in the eighth report (1854) of the Lunacy Commission, this is the position of the majority of English superintendents.

practice. It is my province and duty as physician to distinguish between the use and the abuse, and there are *rare and exceptional cases* in which I deem it as much a duty *to use* some modified form of restraint as I deem it a duty *not to use* it in other cases. The good of the individual patient is the paramount consideration."

Another view is given by Dr. Sutherland, and is essentially the same as Prof. Meynert's of Vienna, that "formerly the patient was strapped down to his bed and not allowed to move; the consequence of which was that the horizontal position favored the congestion of the brain and added to the development of the already superabundant nerve-force, thus producing greater and greater irritation, followed by collapse, typhoid symptoms, and too often death." *

In the second edition (1861) of his work on diseases of the mind, still the standard authority, Griesinger says:—

"When my first edition was published [1845], I agreed with German physicians generally in condemning the non-restraint system. I sympathized with the reform, but could not meet the objections made to it. Since that time, experience from one end of England to the other has answered these objections. I have seen the system in practice, and am convinced. . . . Let no one again say that it is impracticable, . . . or more suitable to the English, because more manageable, than on the Continent, . . . or that the use of it is commendable and its abuse to be condemned. No one can say at what point in the use of mechanical restraint abuse begins; it seems to be almost unavoidable."

He quotes Conolly, however, apparently with approval, as saying that there are rare and exceptional cases where mechanical restraint is best for the individual patient.

It is only fair to say that a different conclusion was reached by Guislain of Brussels, whose work Brierre de Boismont compares with that of Pinel and Esquirol, and who was the best-informed man of his time in regard to the various methods of treatment, having visited the asylums of Italy, Switzerland, Holland, Germany, France, and England, and having, like Griesinger, seen the non-restraint system in practice at Hanwell. He gave Conolly full credit for his noble work, but thought with Ray and Bell, that there were some patients, about one or two per cent., who were better off for some form of mechanical restraint. He said, with Baglivi, "*Aliter enim, in morbis curandis, tractandi Itali, . . . aliter Galli, Hispani, Angli, Germani.*" . . . (Italians, Frenchmen, Spaniards, Englishmen and Germans, all require different kinds of treatment.)

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* Non-restraint System of Treatment of Insanity. By R. Gardiner Hill. London, 1857.

However decided one own's opinion may be on this point, and however honest one's convictions, it must be acknowledged that humane, able and well-informed men still differ as to what is best in individual cases.

Substitutes for Restraint.

It has been thought that there must be some substitutes in England for mechanical restraint,* in wet-packing, etc.; but we find that the Lunacy Commission, in speaking of one asylum where this was used, simply as "medical treatment," say, "This packing should be recorded in the medical journal, and under the head of restraint."

Whether more drugs are used or not, as less physical restraint is resorted to, is chiefly a matter of individual practice, some going so far as to class all use of powerful sedative drugs as "medicinal restraints" to be avoided, and others saying that more narcotics are employed.

It is generally agreed that it has been necessary to have more and better attendants.

Accidents Considered.

The result in England has not been to increase the number of accidents; and it has been stated by Dr. Conolly† and others, although I have been unable to find statistics on the subject, that they have decreased. As compared with our own country, it is found that they have fewer fatal casualties, as the following table (including suicides) shows.

Deaths from a suicidal act committed before admission, sudden deaths from natural causes, as heart disease, epilepsy, etc., are not included.

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* Superintendents of asylums and physicians, in like manner, formerly often went to Hanwell to ask Conolly what he used in its stead.

† Eighth report of the Commissioners in Lunacy, pp. 171, *et seq.*

The quiet insane in the workhouses of England, 10,307 in 1866, and 15,409 in 1875, are also not counted. There are almost no fatal accidents among them.

Table showing Fatal Accidents for Ten Years in Asylums for the Insane.

YEARS.	UNITED STATES.*			ENGLAND AND WALES.			SCOTLAND.		
	Inmates of asylums.	Fatal casualties during the year.	Rate per 1,000 patients of fatal accidents.	Inmates of public and private asylums.	Fatal casualties during the year.	Rate per 1,000 patients of fatal accidents.	Inmates of royal and district, private and parochial asylums.	Fatal casualties during the year.	Rate per 1,000 patients of fatal accidents.
1866, . .	7,634	12	1.57	31,520	26	0.82	4,536	4	0.88
1867, . .	8,034	20	2.48	32,822	48	1.46	4,603	8	1.72
1868, . .	7,813	24	3.07	34,437	44	1.28	4,694	12	2.56
1869, . .	9,505	11†	1.16	35,669	42	1.18	4,932	6	1.22
1870, . .	11,332	17	1.50	36,969	31	0.84	5,368	12	2.24
1871, . .	11,449	16	1.39	37,325	41	1.10	5,431	16	2 95
1872, . .	13,540	25	1.85	38,559	58	1.50	5,039	14	2.78
1873, . .	14,239	22	1.55	39,563	50	1.26	5,740	14	2.44
1874, . .	14,512	25	1,72	40,910	20	0.49	5,826	8	1.37
1875, . .	14,403	34	2.36	42,285	42	0.99	-	-	-
	-	-	1.84	-	-	1.09	-	-	2.04

* The figures include 29 asylums in 1866; 33 in 1867; 27 in 1868; 32 in 1869; 37 in 1870; 33 in 1871; 37 in 1872; 41 in 1873; 42 in 1874; 40 in 1875. The records were not counted, as there were no statistics, of five asylums each in 1868 and 1869; of 4 in 1866, 1867 and 1870; of 3 in 1871, 1872, 1873, 1874; and of 1 in 1875.

† Not including six lost by the destructive fire at one of the asylums.

In preparing the table in regard to this point, the records for the past ten years have been consulted. For this country, reports (380 in all) of the various asylums (51 in number) have been examined through the kindness of Dr. Edward Jarvis, who offered the use of his library. The superintendents, also, were addressed personally, with a view to obtaining reports for those years which were wanting. For Scotland, the suicides and fatal accidents are reported in the tables published in the reports of the commissioners. As it was not entirely clear whether all fatal accidents were reported by the English commissioners, a letter of inquiry was sent to Mr. James Wilkes, who very kindly sent the following reply :—

OFFICE OF COMMISSIONERS
19 WHITEHALL PLACE. S. W., 26

MY DEAR SIR:—I have been away from London
nearly a month, and have not been able to reply to
earlier.

All suicides, both in public and private asylums
in the tables published in our reports showing the ad
charges, deaths, etc., which take place in each.
subjects of special investigation by the board, and
copies of the evidence given before the coroner
Fatal accidents are not included in this table; but
the subject of special inquiry, and, when necessary
investigation by the commissioners. They are alwa
by the commissioners in the reports they make upo
both to county and private asylums, and are also co
in the annual reports they make to the Lord Chancell

I am, dear sir, faithfully yours,

JAM

C. F. FOLSOM, Esq., M. D.

The result of the comparison is to show that
is right in saying* "that non-restraint does not e
restraint diminish or prevent the occurrence of
violence,"—at least if the non-fatal accidents are
proportion as the fatal. This point cannot be
with certainty for American asylums, as reco
published in all cases, as they certainly sho
England it is shown by statistics that the non-fa
have very much diminished in the last fifteen yea
non-restraint system has been more fully carried

If we examine the character of the fatal accid
that there are almost none in our best asylums (
holds true of the best English asylums) except
were due to the patients themselves. In the ca
county asylums, a few of the city asylums, and
ments for the insane in poorhouses, all of whic
the care of men not members of the Associatio
ican Superintendents, and in a few of our state
which are the least creditable to us, either th

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* Op. cit.

ve have been unable to consult them, so that the sult is more favorable to us than if all classes of re included in the account.

itish asylums, too, careful autopsies and inquests d in all doubtful cases, of which the records are blished by the Lunacy Commission; so that we do euphemism of "autochiria" for suicide, as occurred our asylum reports; and they are also complete. ve table of statistics, it is known that all our fatal re not included,* although it is not certain how sions there are. The results do not, therefore, re completeness; but it is thought that, especially five years, they are pretty nearly correct for most ms.

s ago there were many injuries in English asylums to rough handling by the attendants, apparently es such as might have been avoided by the use of restraint or better attendants. The number has ishing, however, and is now very small indeed. re still reported in England accidents of a kind frequency said to be entirely unknown in the der the charge of members of the American Asso- edical Superintendents of Hospitals for the Insane. ny means of getting at the statistics on this point county and city asylums, and so could include the e bad, as is done in England, we probably should od reason to be proud of the result. A careful of English with American state and corporate ds the writer to the conclusion that there is not l kindness and care on the part of the doctors and tle treatment on the part of the nurses in the lat- ccusation that the use of restraint in our best on any other than humane grounds is certainly not adequate knowledge of the true facts.

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e asylums included in the table on page 391, it has been lately ascer- e were four fatal accidents which did not appear in the reports, and ounted.

Question of Escapes.

Another matter is worth considering, and tha
the system of more freedom permits more escap
point Mr. Wilkes says: "During the year 187
376 escapes were registered, and on the 1st of J
there were 40,261 patients in public and privat
England and Wales." He further says that the g
of the patients who escape are returned ver
return themselves), sometimes in a few minu
instances are very rare in which they are not ret

In looking over all the reports for that year
asylums, of which I have copies at hand, I find
15,407 patients in 34 asylums, there were 38
of whom were returned or came back themselves
escaped and did come back are not recorded i
so that, in this point also, the system of more fr
ently has no disadvantage.

Dangerous persons should be carefully watc
allowed to escape; but the moral effect of occas
ing a harmless patient to wander away, and fin
self that he must go back, is certainly not a pre

Summary of Restraint Question.

This subject of mechanical restraint has bee
some length, because it has lately excited a
attention. Both here and abroad, a great man
and untrue statements have been made, and
been copied and commented upon, giving ris
deal of misunderstanding; a matter which can
better form than by quoting from a recogn
authority, who says, in a private letter recen
"I received the Journal of Medical Sciences,
reason to complain of being misquoted, but th
argument, the writer failed to appreciate. I
parable against the intolerance of non-restrai
certainly, because they are in the majority in
but I meant it equally to apply against intoleran

es of restraint. Now, that article is as intolerant on anything that has ever been written or said on side in this country, and the writer omitted to I, who had never employed restraint, was the f tolerance towards those who are opposed to me. the arguments in favor of restraint are only a f what used to be said in this country by the of the abolition of restraint.

t some amount of force in the argument about the people being less easily controlled, or, I should menable to discipline, than the inhabitants of this out, for that reason, I should apprehend they would gradation of restraint all the more keenly. On the American patients, I am not speaking without some , as I frequently have them in this asylum; and, ill worse, according to my experience, Irishmen returned from America, and who, as usual, have ne vices (if I may so term a repugnance of disci-he people amongst whom they have lived, without heir virtues.

been in the habit of thus classifying, mentally (*i. e.*, mind), my Irish patients: (1.) The recent im-are generally docile and manageable; (2.) Those ived some time in Liverpool or other manufactur-and who have lost all their native docility and ne vices of their Saxon neighbors without having ped their self-reliance; (3.) Those who have re-m America, who kick against discipline of any . . . To return to the subject of restraint, I ay assert that if it can be dispensed with in this can be anywhere; for a more degraded, lawless are sent here, are not to be found in this country. I do *not* think that the leading superintendents in y favor restraint; no doubt sentiment leads many far in theory, but I really believe that, in England, nt men are in a small minority."

country, alienists look upon the use of mechanical s a purely medical question; but there are so r interests, social and moral, connected with it,

that Dr. Bucknill is undoubtedly right in sayi
is a matter upon which persons who are not sc
eventually insist upon having much to say, unles
nitely settled beforehand." In some of the be
and also in some of the best American, asylum
ciple is essentially alike; namely, to use mechani
only when the interest of the patient demands it.

The *practice* is widely different in the two coun
respect. One physician in England, for instance,
about forty patients of all degrees of severity in
and who uses mechanical restraint when he deems
the patient, wrote February 6, 1875, that he was
it for the first time in twenty years, and oddly en
cases. Generally speaking, the amount used in t
is very small indeed.* In the United States, the
a progressive improvement in the last five years;
be any doubt that there will be a still less amount
used, and that the methods found so successfu
will be more generally adopted after they have b
known. At the present time, the use of mechani
in some of the American asylums is excessive, b
so than is common on the continent of Europe.

This marked difference of interpreting the ne
case, with reference to the requirements of hum
use of mechanical restraint, has caused a great
understanding, in this country, of the position
superintendents; so that they have been though
not thoroughly informed, to say much more than
mean when recommending mechanical restraint
necessities of the case demand it. In the sam
superintendents are thought in England to use i
they really do.

The English county asylums, filled with inacti
cannot fairly be placed in full comparison wit
asylums, overcrowded, insufficiently supplied w
ants, and provided for a less manageable class of

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* Compare the statement of Mr. Wilkes, page 388.

† It should be remembered that the asylums at Perth and Broadm
inal lunatics remove that class, which (except in New York) must b
ordinary asylums; that the large English asylums are mostly for pa
the more intelligent classes are generally treated in private asylums.

t of itself does not render the non-restraint system to us, nor prove that it is not the best. Perhaps nd the "golden mean" somewhere between the the countries, but nearer the English side.

ration of the principle of non-restraint was shown im in England, where there were padlocked guards replaces, which also had been covered with wire ough which a patient, in the absence of attendants, ong taper, lighted it, and killed herself by setting lothes. The superintendent had all the fireguards, the attendants found that they must look after s, and no similar accident occurred again.

LITY FOR CRIME,* AND DEFINITIONS OF INSANITY.

l be an interesting study to follow the gradual nt of rational views on the part of the community d to mental disease, but it is not necessary here. nds very nearly with general intellectual develop-

out the beginning of the present century, Lord ciple was held by the courts, that to be exempted hment on the ground of insanity, a man must be f all memory and understanding, and no more he is doing than an infant, brute, or wild beast. f which the criminal act was the direct offspring, t test; and then the *general* power of distinguishing wrong. A little before the middle of this century, *lar* knowledge of right and wrong at the time the t was committed was laid down by the judges as n of responsibility. Under this decision, an in-ould be held exempt from punishment if he killed n whom, by virtue of his delusion, he supposed to a mortal attack upon himself; if he supposed that injury only was to be done to him, murder com-

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hed upon here only very briefly, as a matter of necessity. The general red for further information to Ray's "Medical Jurisprudence" and to Mental Pathology," to Maudsley's "Responsibility in Mental o the last edition of "Casper's Forensic Medicine."

mitted under this delusion would render him liab ment, while, at the same time, he could not a will. This illogical position is not now generall country, and some recent decisions have been formity with more rational views; but that cri occasionally be acquitted on the ground of insan persons evidently insane should suffer judicial be unavoidable so long as there can be no defini between sanity and insanity. The recent decis Kullmann, who attempted to assassinate Prin was acquitted of deliberate attempt to murder, o of limited responsibility arising from heredita although he was in no sense insane,—may b sidered far in advance of any other judgment of n In striking contrast with this, is a late English d patient, an insane epileptic in one of their asylu attendant. At the trial, the judge held that—

> "Where a man committed crime for some suppo if he knew that what he was doing was contrary to be held responsible for his actions. If a man killed under delusion that he himself was about to be kille was acting in self-defence, he would not be punish man did so for some supposed injury to his charact then the man would be responsible. . . . If the isfied that, although Fordham was suffering from delu what he was doing, and was not merely taking life neous impression that he was defending his own l because he felt himself injured in some form or othe their duty to find him guilty."

Fordham was declared guilty and sentenced but there was afterwards commutation to penal life. The superintendent of the asylum in wh was confined was one of those who thought sible. The question of self-control apparently sidered.

The Commissioners in Lunacy (a board in wh three physicians and three lawyers who visit

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* Thirtieth Annual Report of the Commissioners in Lunacy, Lo and 41.

led, in 1873 (and there is no dissent expressed in
t on the part of any members), that a patient in
ir insane asylums, who had committed murder
, should suffer the full penalty of the law.* Some
re this, an attendant was convicted in court and
on the sole evidence of an insane patient.
connection, it is proper to say that the English
ode is very much more severe than ours; and it is
herefore, that their limitations of responsibility
less favorable to all offenders against society.†
ng the criminal, insane or not, from the humane
iew, our own country, during the past century,
greater progress than this, as have also France and

as insanity was considered a disease of an imma-
l, a *seelenstörung*, the greatest confusion existed in
. One of Esquirol's pupils described‡ it in 1817
nt of control of our feelings and propensities."
1832, testified in an English court that he had
a sane person; saying, too, "I presume the Deity
d mind, and he alone."
later, the capability of repeating the multiplication-
gravely propounded in an English court as a
anity in a case involving a large sum of money.
Browne, in his lecture on *What is Insanity*, says
efinition is an enigma which Œdipus could not
d.
e clinical study of mental disease in the European
nd with the impulse given to scientific research by
topsies, the immaterial theory of insanity has dis-
In 1854, in an essay on Unsoundness of Mind in

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hth Report, 1874, page 2.
one's time, for instance, there were one hundred and forty capital offences.
entence boys of twelve to a dozen lashes for such offences as throwing
oad trains. The penalty for unlawfully destroying or damaging "any
ument exposed to public view" is whipping, if the offenders are under
of age; for highway robbery with violence judges may, at their discre-
n do sentence to imprisonment, with or without a certain number of
ion.
ent of Lunatics, with Illustrations of Insanity. By George Parkman,
, 1817.

Relation to Criminal Acts, to which the first S
was awarded, Dr. Bucknill describes insanity a
tion of the mind in which a false action of co
judgment, a defective power of the will, or an u
violence of the emotions and instincts have separ
jointly been produced by disease." Two recen
illustrate still greater advance, and the differenc
two years is well worth noting:—

"Insanity is, in fact, disorder of brain, producin
mind; or, to define its nature in greater detail, it is
the supreme nerve-centres of the brain,—the special o
—producing derangement of thought, feeling, and ac
or separately, of such degree or kind as to incapaci
vidual for the relations of life. . . . Mind ma
physiologically as a general term, denoting the sum-
functions of the brain which are known as thought, fee
By disorder of the mind is meant disorder of these fu

"Insanity consists in morbid conditions of the br
of defective formation or altered nutrition of its subst
by local or general morbid processes, and characteri
by non-development, obliteration, impairment, or perv
or more of its psychical functions."[†]

"Disorder of brain" and "morbid conditions
are such general terms as to include all con
those usually called reflex, giving rise to insan
definitions also embrace too much, for they cle
the delirium of starving, drunkenness, and of
acute febrile conditions as well of the brain
organs. No one, for instance, would be justifie
the raving of brain fever or pneumonia insanity,
conditions (as defined above) of irresponsibilit
has been proposed to get over the difficulty by
word insanity to permanent disorders of the ce
ties, carefully avoiding even the expression in
tacks. If this could be done, a great gain wou

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[*] Responsibility in Mental Disease. By Henry Maudsley, M.
Series. New York, 1874.

[†] Dr. J. Batty Tuke in the Edinburgh Medical Journal, November

; for there are many forms of mental disease of tion, pursuing a definite course and self-limited, d fever, in which the recovery is complete, and in purely physical symptoms are very slight. Again, irrent forms of "insanity," with entirely healthy there are many reasons for supposing that we successive attacks of a malady, where, as in the diseased organ recovers wholly its tone, with a fixed malady like syphilis, where, even long intervals of apparent health, the disease can- be said to be cured, beyond possibility of reäp- of transmission to offspring, until death.

he above definitions, unsatisfactory as they are, sisted on, many of the disputes between the law- e doctors would settle themselves. Men trained and in exact scientific observation would then o the pathological condition of a given individual y is questioned, and other men, trained in a dif- and accustomed to take a broader view of social would decide as to the limitation of responsibility.

SETTS STATISTICS AND ASYLUM ACCOMMODATION.

ber of the insane known to the officials and under the State increases from year to year in all We have no absolute statistics, by which we can this increase is apparent and how far it is real; ther the actual proportion of recent cases to the is greater from year to year. The life-saving better medical skill, and the more humane views le at large, have undoubtedly tended to very much in chronic diseases. We do not now leave the lame by the wayside to die. The natural result e are more invalids of all classes, many of whom sely and beget debilitated offspring to still further number.

wing table shows the number of the insane in our Massachusetts at the end of each year since 1820, te per 100,000 of the population for the census

YEARS.	Patients at end of year.	Patients per 100,000 of the population.	YEARS.	Patients at end of year.	Patients per 100,000 of the population.	YEARS
1820, . .	50	9.55	1839, . .	337	-	1858,[4]
1821, . .	28	-	1840,[2] .	457	61.99	1859, .
1822, . .	42	-	1841, . .	476	-	1860, .
1823, . .	54	-	1842, . .	474	-	1861, .
1824, . .	51	-	1843, . .	495	-	1862, .
1825, . .	54	-	1844, . .	530	-	1863, .
1826, . .	55	-	1845, . .	632	-	1864, .
1827, . .	57	-	1846, . .	667	-	1865, .
1828, . .	69	-	1847, . .	723	-	1866,[5]
1829, . .	65	-	1848, . .	752	-	1867, .
1830, . .	69	11.34	1849, . .	816	-	1868, .
1831, . .	68	-	1850, . .	845	84.97	1869, .
1832, . .	64	-	1851, . .	898	-	1870, .
1833,[1] . .	181	-	1852, . .	977	-	1871, .
1834, . .	198	-	1853, . .	979	-	1872, .
1835, . .	196	-	1854,[3] .	1,071	-	1873, .
1836, . .	209	-	1855, . .	1,029	90.87	1874, .
1837, . .	271	-	1856, . .	1,082	-	1875, .
1838, . .	311	-	1857, . .	1,082	-	

[1] Worcester Asylum opened. [2] South Boston Asylum opened. [3] Tau
[4] Northampton Asylum opened. [5] Insane department in almshouse at

The next table shows for each year since 183
of admissions to our asylums (excluding trans
number of *acute cases; i. e.*, those who had bee
a year. This latter division is not perfect, but i

YEARS.	Admissions.	Acute Cases.	YEARS.	Admissions.	Acute Cases.	YEARS
1832, . .	94	44	1847, . .	488	275	1862, .
1833,* . .	256	91	1848, . .	490	247	1863, .
1834, . .	237	115	1849, . .	511	251	1864, .
1835, . .	196	104	1850, . .	487	267	1865, .
1836, . .	231	99	1851, . .	519	252	1866,*
1837, . .	288	137	1852, . .	506	265	1867, .
1838, . .	315	149	1853, . .	474	227	1868, .
1839, . .	311	155	1854,* .	593	309	1869, .
1840,* . .	442	165	1855, . .	586	280	1870, .
1841, . .	367	182	1856, . .	627	352	1871, .
1842, . .	377	206	1857, . .	662	377	1872, .
1843, . .	398	205	1858,* .	673	344	1873, .
1844, . .	424	242	1859, . .	749	378	1874, .
1845, . .	433	230	1860, . .	817	438	1875, .
1846, . .	469	263	1861, . .	846	412	

our present purpose. The years in which new
opened are marked with an asterisk. For the
sive quinquennial periods, beginning with 1836
tions of acute cases to admissions have been

'4, 53.54, 49.42, 47.96, 56.34. The acute cases outh Boston Asylum are not included in the last rs, as there were no records by which they could got; they would make the percentage of acute cases ater for the last four quinqennial periods.

ot, indeed, say definitely just how much influence vation and prolongation of life has in increasing of our insane; and the cure-rates in asylums are n such different bases by different individuals, and cs are otherwise so incomplete, that we should not from considering them with reference to this t it is clear that the number of curable cases exist- State is less in proportion to the whole number o year. On the other hand, under the influence d confidence on the part of the public, a larger insane of all classes are admitted to our asylums while the incurable cases accumulate, so that the coveries *seems* less; and this fact explains many uzzling statistics of our insane asylums.[*]

iew be correct, the annual rate of increase must at diminish and finally cease to be anything; and " it f remark that the total increase of the past year r the preceding one has been less than in any other 1859 in England,[†] covering the period (eighteen ng which full statistics have been kept. Perhaps e point has been reached there.

g to Dr. Jarvis's accurate and exhaustive report to ture in 1855, there were then in Massachusetts, e and 1,087 idiots, with a population of 1,132,369. sus of Massachusetts, in 1875, there were 3,637

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istration of this fact is found in the statistics of the only insane asylum e three decades and a half of its existence, from 1840 to 1875, where death-rate and diminishing cure-rate indicate the change in the charac- nts admitted and treated:—

TIME.	Number of Patients Admitted.	Proportion of Cures to Admissions.	Proportion of Deaths to Admissions.
	1,064	42.10	7.80
	1,185	40.75	17.80
	1,374	40.32	23.28
ne-half decade,	953	36.41	25.81

eport of the Commissioners in Lunacy, page 2.

insane and 1,340 idiotic—with a population o
During the year 1875, there were about 3,800 ins
to the Board of State Charities, so that the nun
census returns must fall somewhat short of the tr

By Dr. Jarvis's statistics there was one insan
every 430 of the population; by the census of
many; namely, one in 454. If the ratio were th
1855, our present number of the insane would b
can hardly fall far short of 4,000.

September 30, 1875, there were 2,722 under the
of the Board of State Charities:—

In state hospitals, ...
 corporate and private and county hospitals, .
 the workhouse, ...
 the state prison, ...
At Monson, ...
In the care of overseers of the poor outside of hospita

All of our state hospitals are crowded, and
less than half of our insane can be treated in th
that condition, while we are building two ne
which will, by crowding, accommodate at most
When these are finished we shall have provision
for about 2,600, or nearly two-thirds of our ins
overcrowding. The McLean Asylum and the
at South Boston will accommodate together nea
that, if hospital provision is needed for three-fou
insane (or 3,000), the State really needs to provid
to do which, even if we do not allow for any inc
numbers to be cared for in institutions, the old
Worcester and at South Boston will probably
unless we adopt some new plan of provision for
Otherwise, the wards of our asylums will soon
overflowing; and this overcrowding, to be found
over our whole country, increases excitement in
and renders their classification and management
difficult. Massachusetts is as well provided as
probably, in this respect; and yet there are

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* This is somewhat less than are provided for in Scotland and Eng
and departments for the insane of workhouses.

more patients than can be properly accommo-
m.

of our States, indeed, have provided sufficient
ommodation for their insane, and we may well
from their experience. In regard to this point,
anney, the well-known superintendent at Mount
wa, writes :—

State in the Union, the attempt or prevailing custom
e common or ordinary pauper and the insane in the
se, with the prevailing want of proper separation and
has been a scandal and a reproach.
hat the two hospitals for the insane in this State, with
table for only 550, contain to-day about 865 patients,
re at least, or not far from, 1,200 insane, is of itself
lence that there are not adequate provisions for the
State. In this particular, however, I do not suppose
behind many or most other States, the newer as well
Like some other States, Iowa has provided for the
very expensive hospital,—unnecessarily expensive in
-now about half completed, which will cost about
about $2,000 per patient.
nd that this great outlay will have the effect, as similar
ere has had, in the opinion of some, to prevent ade-
n being made of a cheaper but in every way suitable
has long seemed to me very inconsistent to provide
for one-half of the insane and doom the other half,
ing, to poorhouses or receptacles that at the best are
they should be, or to severe struggles with want and
e hands of their friends. I have yet to see reason
a hospital costing $2,000 per head will be more con-
recovery of patients from insanity than one costing
r even less."

w McFarland of Illinois, an alienist of large ex-
s :—

ry of the relation of the State to the insane here is
l probably has its counterpart in most other States.
D. L. Dix, after extensive exploration, drew a most
ure of the condition of the insane in the State, which
in a memorial to the Legislature. The establishment
pital followed, which was opened in 1851. But it filled
vith no perceptible relief to the accumulating mass.

> The State was slow in proceeding further, and soon
> 1847 might have been drawn in even darker colors
> accommodations were doubled, *and still no relief.*
> three state hospitals, first-class in size, with a coun
> Chicago, equal in capacity; yet with all this, we *g*
> *relief.* It is not surprising that intelligent legislat
> long is this to go on, and are you sure your lead
> direction?'"

Dr. C. F. McDonald, superintendent of th
the criminal insane at Auburn, N. Y., writes:—

> "'Overcrowded' seems to be the fixed condition o
> insane hospital in the country. In looking over
> American institutions for the insane, one is struck wi
> in almost none is the subject of overcrowding not c
> fact, allusion to the topic is so common, that I have
> if we shall ever see the time when we can say, 'Ou
> our insane population are adequate.'"

And Dr. A. Reynolds, of the state asylum
ence, Iowa, adds:—

> "No state west of the Alleghanies has adequate h
> for her insane. Until hospitals are built at a less
> than $1,000, it is useless to talk of providing for a
> the State."

SUPERVISION BY THE STATE.

Committal to Asylums.

The late Dr. Samuel G. Howe, after twenty
relation with some of our public establishments
and after ten years' experience as visitor to all
pitals of Massachusetts, said:* "All human in
of course, liable to abuse, but our Massachusett
lunatics are as well guarded against them as any
lishments with which I am familiar"; and agai
rather too many than too few difficulties in the w
tal" of patients to insane asylums in our State.

Although a different position is held in the
commissioners of lunacy, appointed for a sin

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* Boston Daily Advertiser, March 22, 1873.

the Legislature, January, 1875, there are no facts e in support of that opinion; but recent investiga- wksbury and at Westborough seem to indicate that ılt either in the laws or in their execution.

Improper Committals.

een urged before our legislatures, that many persons not insane are improperly confined in our asylums, any complaints are made by patients which could ended to by an impartial commission.

mproper confinements, our superintendents have at they are rare, soon discovered, and promptly set ey must occur occasionally, so long as human judg- lible, but no wisdom or foresight can always prevent e very professor of mental disease, some years ago, he first German universities, with the benefit of a n of the hospital staff, was committed to an insane en suffering from typhoid fever.

ng over a pile of American reports, the first two in d any mention of this point are from Utica, N. Y., ont, Penn., justly considered as among our best . In the asylum at the former place, of 11,831 dmitted from 1843 to 1875, 175 were found not to Of 2,981 consecutive admissions at Dixmont there anity in ten cases. But in all these cases, which lipsomaniacs, opium-eaters, and others suffering e form of delirium, there was not one of intentional or illegal committal.

forms and degrees of mental disease, no more per- estions come before the expert than *whether* to send s, *when* to send to asylums, and *when* to advise and here there is room for very wide differences . The only thing we can do is to provide as many as possible, the greatest of which is in the high char- r superintendents. These men should have large ly guarded, should be held to a strict accountability, d be trusted by the officers of the State, in order ay get the confidence of their patients.

More or Better Supervision Needed

Without maintaining that, with all the supervi
by the patients in our Massachusetts asylums, t
of another commission to still further protect th
need which is now urgently felt in some of our St
hardly be doubted that great benefit would arise fr
tem and better methods in such inspection. Th
of well-organized supervision cannot be better stat
experience of a State which has already tried the
By a law passed in 1876, all the asylums (of all ki
sas were placed under one board of trustees;
report on the insane asylum at Ossawatomie, they

> "It gives a uniform direction to their management
> enables them to compare the advantages and disadva
> different systems of management, and to abolish the
> graft the good features thereof into each to their be
> sions a close scrutiny of the condition and requirem
> . . . *and it has resulted in a large reduction of the*

One of the most distinguished alienists in E
after carefully visiting thirteen of our asylums, a
our customs pretty thoroughly,—

> "Unless I am much mistaken, the superintendent
> in America have a heavy task before them, which will
> a determined effort before they can say that they poss
> dence of the public in the same degree to which of lat
> been extended, in England, to the management of our c
> and hospitals for the insane. With us, the manageme
> lums is open and patent. Abuses occur, as they wil
> where; but they are remedied, and, if need be, punishe
> public manner, and the records of them are displayed t

Uses of a Commission.

There are many particulars, indeed, beyond p
the rights of the insane, in which a properly cons
mission, if wisely selected, might be of use, e
collecting facts and diffusing information for the

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* The asylum now building at Topeka for the insane will cost less
as much per patient as some of those recently built in other States.

† The Lancet. London, 1876.

insanity is, as Sir James Coxe says, a disease of
and our chief reliance in arresting its progress
an increase of knowledge among those who may
ed liable to it. The public has the right, too, of
st how asylums are conducted; and the fact that
f all of them were to be open to inspection, would
ease popular confidence in their management.

alse Position of American Association.

rican Association of Superintendents have opposed
nissions. They refer to the humiliating story of
commissions, etc., and think that such a body as
be appointed at Washington would be of negative
at least as much harm as good,—an argument
ortunately, must be acknowledged to have very
it. They assume, too, that the State would do
interfere with the absolute control, which they
rintendents of insane asylums should have over
itted to their charge. They say:*—

> ne shall ever come when the Legislature, in its zeal for
> ood, shall establish a board of officers to supervise the
> tice of the State, with power to enter every sick man's
> inquire respecting the medicine and diet prescribed, and
> atter connected with his welfare, and report the results
> nination to the constituted authorities, then it may be
> onsider the propriety of extending the same kind of
> tation to the hospitals for the insane."

opinion we may have as to the necessity of
al supervision, there can never be any analogy
two cases until our laws are very different from
in force. A sick man, in his chamber, is sur-
his dearest friends and relatives, who sacrifice
omfort to his needs. In the asylum, his wants are
d to exclusively by those who are paid to do so;
select his physician, he cannot change his nurse,
order his food or discharge his cook, and often
mmunicate with his friends for many weeks.
ult to conceive that such a position could be taken,
a very narrow standpoint, and with an undue

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* Resolutions, 1874.

sensitiveness as to public opinion. It would
for instance, in a society like the British Medico
Association, composed of medical superintend
physicians in asylums, physicians in general pr
of the peace, and lawyers.

Complaints of Discharged Patien

The complaints of discharged patients and
asylums, if investigated by a fair commission,
satisfactorily disposed of than at present, an
relieve the superintendents of undeserved cens
full and not undue weight to such complaints
an intimate knowledge of mental disease, an
with the history of the complainant which the
get. They are often plausible, frequently trivi
the sympathies of philanthropic people to a
ways proportionate to their importance, altho
far otherwise. The really sensible criticisms
on our asylums come chiefly from persons wh
ered, and who avoid rather than seek notoriety

For the purpose of considering the bearin
tion, discharged patients may be classified as
Those who have recovered, and whose min
enough, during a considerable part at least of t
have received clear impressions of what was
them, and who have remembered with tolerab
by no means an insignificant number. 2d. Th
above, except that they have not remembered
who have recovered, and whose minds were a
during the time of their severe illness, so that
absolutely nothing of that time, and more or less
their period of convalescence. 4th. Those who h
and whose impressions during a large part of t
in the asylum were more or less tinged by t
sions; of whom some finally recognize the de
acter of their previous ideas, and others never d
in other respects perfectly well.

There are four other classes corresponding
the single difference that they have never recov

be very unjust and untrue to say that there are discharged patients from insane asylums whose and general statements are fully as trustworthy as ther people. But there are many others also, minds the false impressions once made are not nd it is often a matter of the greatest difficulty for pert to decide between the two.

erintendents of the asylums might easily dispose of accusations and complaints by publishing a few their records, and showing to the public the real ch cases. This, however, their sense of honor eir doing, for their patients' secrets are held by sacred trust.

ression which is sometimes given, that the mere fact rged patient's making complaints or criticisms in sylum management is *ipso facto* evidence of incom- very, and that those entirely well always speak of everything that happened to them during their s not need consideration here.

Best Supervision.

supervision consists in frequent visits of friends , and this has lately been done to a great extent, in asylums of the McLean type, although begun sively adopted nearly twenty years ago under Dr. the South Boston Asylum, and now considered by ur superintendents as one of the most important e thought of in locating new asylums. Dr. Clous- inburgh thus speaks of this important matter in for 1875:—

> in this peculiar and almost unique position in Scotland, ur number of yearly admissions increases, our numbers nd of the year have diminished for the past three years. everal causes for this. Our recoveries are very numer- arge number of unrecovered but quiet cases are removed, ce, by their friends. Our proximity to town and the rily ready access provided by the tramways are circum- ch most people, and among them many high authorities atters, would consider great disadvantages. Their effect

is to bring the relatives of our poorer patients out to the asylum to visit them, to an extent quite unknown in country asylums. In this way, an interest in them is kept up, and very few of them indeed are forgotten and neglected by their kith and kin. This is an influence which often saves them from falling into incurable insanity; it gives many of them unbounded pleasure, it keeps alive home feelings and associations, and it brings a direct public opinion of the most unsleeping and critical kind to bear on the officers and attendants of the institution—all matters of incalculable importance and much difficulty of attainment.

"When the relatives see that the acute symptoms have passed off, they are often disposed to take them out for a day or two to see how they get on. If this succeeds they try them at their usual employments, and, if they do well, are often anxious to have them home altogether. It is by this most natural of all means that any undue accumulation of the incurably insane has been avoided for the past three years, and the problem of how to provide for such, which is so urgent in many parts of the kingdom, has been solved for us at no cost to the rates whatever. I find from the report of the commissioners in lunacy that Edinburgh is the only county in Scotland the majority of whose population is urban, where the numbers of the registered insane, whether in asylums or not, have absolutely diminished for the last three years."

Another beneficial result of this frequent visitation is noted in higher standards of excellence, and consequently increased confidence of the community. In commenting on the fact that 1,026 patients were treated in the year passed (1875), *without the occurrence of a single suicide, untoward accident, or case of epidemic disease*, although extensive alterations in the asylum were making, the report continues:—

"In addition to the requisites of a good ordinary hospital, in the way of light and air, ventilation and cheerfulness, sanitary apparatus and baths, and convenience of administration, we require extended and varied means of occupation and amusement, day-rooms, dining-rooms, and workshops of all kinds, extensive gardens and farms, pleasure-grounds, and billiard-rooms, etc. The extreme importance of the curative aspect of the institution, as distinguished from its boarding-house character, *is amply attested by the enormous and increasing number of admissions of recent cases.*"

This statement may well be considered carefully, where decreased confidence on the part of the community is complained of as a cause of fewer admissions of acute cases.* Can we not, too, in some such way, reduce the accumulation of chronic cases in our public institutions and diminish that unfortunate class described by Maudsley as "asylum-made lunatics"?

Good Asylums, as a Rule, Better than Homes.

The first patient admitted to a Massachusetts insane asylum was a person brought by his own father, who thought the young man to be possessed of a devil, and whose treatment consisted in whipping him. From that day to this, although the ideas of the people have very much changed and more enlightened views prevail, no one familiar with the insane can, I think, for a moment doubt that they often are treated with more uniform consideration and kindness in our best asylums than by their own friends in their own homes. Individual and striking illustrations of this statement are constantly brought under the observation of the officers of asylums.

It is the opinion of asylum superintendents, too, almost universally throughout the country, that, taking all things into consideration, treatment in an asylum gives the most chances of a cure † in the majority of cases, in spite of the fact that, as they are now constructed, the good of the individual must be occasionally sacrificed to conform to requirements deemed necessary for others, but not needed by him.

We must not think, however, that an asylum, as now existing, is the only thing possible or the best thing practicable in all cases. Florence Nightingale, in 1876, summed up her great experience in these words, "Hospitals are but an intermediate stage of civilization. At present, hospitals are the only place where the sick poor can be nursed, or, indeed, often the sick rich. But the ultimate object is to nurse all sick at home." Sir James Simpson devoted the ripest years of his life to opposing the agglomeration of disease of all kinds. Sir James Coxe, after forty years' active work in the medical profession, and nearly twenty years on the lunacy commission of Scotland, attaches no therapeutic value to insane asylumns, but regards them simply as conveniences. Professor Meynert tells the physicians from all parts of the world, who listen to his lectures in Vienna, that something is lost in all cases although more is generally gained, in sending an insane person to an asylum. Maudsley, Blandford and others treat even some of the most violent forms of mental disease in private houses in those rare cases when the circumstances, surroundings and associations of their patients are such that they can command anything that is needed for their proper treatment; and cures are often more rapid thus. The cases are decidedly the smaller number, however, where home treatment of insanity can be recommended, and the points in which our asylums excel are growing more from year to year.

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* The fact is that the two are not necessarily at all connected. If the community simply learn to trust asylums more, they will send more of their friends to them, until they are full; if they learn, also, that the chief object of the asylum is curative, that the wards are not crowded to excess with inmates who would be better off elsewhere, and that the idea in treatment is to keep people out of asylums, as far as is practicable, they will act accordingly.

† This opinion is, of course, entitled to great weight; but the statistics upon which it is sometimes based do not prove the fact. It is stated, for instance, that of those who enter an asylum early, from seventy to ninety per cent. are cured, and in a short time; while the others are incurable just about in proportion as their friends delay sending them to asylums. If, in similar way, we grouped all pulmonary diseases together, we might prove that a large proportion of cases of pleurisy and lung fever get well because the symptoms in those diseases are early severe enough to make hospital treatment or rest in bed necessary, and that consumptives never get well because they never seek hospital treatment until progressive weakness compels them to do so, or until the disease is far advanced,—a manifest *reductio ad absurdum*.

Project of a Law.

The American Association of Superintendents, a half-dozen years ago, prepared a project of a law, which has become a statute in Pennsylvania, giving their views upon this general question. So far as they go they are admirable, and are given here entire as dealing with an important subject:—

"The Association of Medical Superintendents of American Institutions for the Insane, believing that certain relations of the insane should be regulated by statutory enactments calculated to secure their rights and also the rights of those intrusted with their care, or connected with them by ties of relation or friendship, as well as to promote the ends of justice, and enforce the claims of an enlightened humanity, for this purpose recommend that the following legal provisions be adopted by every State whose existing laws do not already satisfactorily provide for these great ends:—

"1. Insane persons may be placed in a hospital for the insane by their legal guardians, or by their relatives or friends, in case they have no guardians; but never without the certificate of one or more reputable physicians, after a personal examination, made within one week of the date thereof; and this certificate to be duly acknowledged before some magistrate or judicial officer, who shall certify to the genuineness of the signature, and to the respectability of the signer.

"2. Insane persons may be placed in a hospital, or other suitable place of detention, by order of a magistrate, who, after proper inquisition, shall find that such persons are at large, and dangerous to themselves or others, or require hospital care and treatment, while the fact of their insanity shall be certified by one or more reputable physicians, as specified in the preceding section.

"3. Insane persons may be placed in a hospital, by order of any high judicial officer, after the following course of proceedings, viz.: On statement in writing, of any respectable person, that a certain person is insane, and that the welfare of himself, or of others, requires his restraint, it shall be the duty of the judge to appoint, immediately, a commission who shall inquire into and report upon the facts of the case. If, in their opinion, it is a suitable case for confinement, the judge shall issue his warrant for such disposition of the insane person as will secure the objects of the measure.

"4. The commission provided for in the last section shall be composed of not less than three, nor more than four persons, one of whom, at least, shall be a physician, and another a lawyer. In their inquisition they shall hear such evidence as may be offered touching the merits of the case, as well as the statements of the party complained of, or of his counsel. The party shall have seasonable notice of the proceedings, and the judge is authorized to have him placed in suitable custody while the inquisition is pending.

"5. On a written statement being addressed by some respectable person to any high judicial officer, that a certain person, then confined in a hospital for the insane, is not insane, and is thus unjustly deprived of his liberty, the judge, at his discretion, shall appoint a commission of not less than three, nor more than four persons, one of whom, at least, shall be a physician, and another a lawyer, who shall hear such evidence as may be offered touching the merits of the case, and, without summoning the party to meet them, shall have a personal interview with him, so managed as to prevent him, if possible, from suspecting its objects. They shall report their proceedings to the judge, and if, in their opinion, the party is not insane, the judge shall issue an order for his discharge.

"6. If the officers of any hospital shall wish for a judicial examination of a person in their charge, such examination shall be had in the manner provided in the fifth section.

"7. The commission provided for in the fifth section shall not be repeated, in regard to the same party, oftener than once in six months; and in regard to those placed in a hospital under the third section, such commission shall not be appointed within the first six months of their residence therein.

"8. Persons placed in a hospital under the first section of this act may be removed therefrom by the party who placed them in it.

"9. Persons placed in a hospital under the second section of this act may be discharged by the authorities in whom the government of the hospital is vested.

"10. All persons, whose legal status is that of paupers, may be placed in a hospital for the insane by the municipal authorities who have charge of them, and may be removed by the same authority, the fact of insanity being established as in the first section.

"11. On statement in writing to any high judicial officer, by some friend of the party, that a certain party placed in a hospital under the third section is losing his bodily health, and that consequently his welfare would be promoted by his discharge, or that his mental disease has so far changed its character as to render his further confinement unnecessary, the judge shall make suitable inquisition into the merits of the case, and according to its result, may, or may not, order the discharge of the party.

"12. Persons placed in any hospital for the insane may be removed therefrom by parties who have become responsible for the payment of their expenses; provided that such obligation was the result of their own free act and accord, and not of the operation of law, and that its terms require the removal of the patient in order to avoid further responsibility.

"13. Insane persons shall not be made responsible for criminal acts in a criminal suit, unless such acts shall be proved not to have been the result, directly or indirectly, of insanity.

"14. Insane persons shall not be tried for any criminal act during the existence of their insanity; and for settling this issue one of the judges of the court by which the party is to be tried shall appoint a commission, consisting of not less than three, nor more than five persons, all of whom shall be physicians, and one, at least, if possible, an expert in insanity, who shall examine the accused, hear the evidence that may be offered touching the case, and report their proceedings to the judge, with their opinions respecting his mental condition. If it be their opinion that he is not insane, he shall be brought to trial; but if they consider him insane, or are in doubt respecting his mental condition, the judge shall order him to be placed in some hospital for the insane, or some other place favorable for a scientific observation of his mental condition. The person to whose custody he may be committed shall report to the judge respecting his mental condition, previous to the next term of court, and if such report is not satisfactory, the judge shall appoint a commission of inquiry, in the manner just mentioned, whose opinion shall be followed by the same proceedings as in the first instance.

"15. Whenever any person is acquitted in a criminal suit, on the ground of insanity, the jury shall declare this fact in their verdict; and the court shall order the prisoner to be committed to some place of confinement for safe-keeping or treatment, there to be retained until he may be discharged in the manner provided in the next section.

"16. If any judge of the highest court having original jurisdiction shall be satisfied by the evidence presented to him that the prisoner has recovered, and that the paroxysm of insanity in which the criminal act was committed was the first and only one he had ever experienced, he may order his unconditional discharge; if, however, it shall appear that such paroxysm of insanity was preceded by at least one other, then the court may, in its discretion, appoint a guardian of his person, and to him commit the care of the prisoner, said guardian giving bonds for any damage his ward may commit: *provided, always*, that in case of homicide, or attempted homicide, the prisoner shall not be discharged unless by the unanimous consent of the superintendent and the managers of the hospital, and the court before which he was tried.

"17. If it shall be made to appear to any judge of the supreme judicial court, or other high judicial officer, that a certain insane person is manifestly suffering from the want of proper care or treatment, he shall order such person to be placed in some hospital for the insane at the expense of those who are legally bound to maintain him.

"18. Application for the guardianship of an insane person shall be made to the judge of probate, or judge having similar jurisdiction, who, after a hearing of the parties, shall grant the measure, if satisfied that the person is insane and incapable of managing his affairs discreetly. Seasonable notice shall be given to the person who is the object of the measure, if at large, and if under restraint, to those having charge of him; but his presence in court, as well as the reading of the notice to him, may be dispensed with if the court is satisfied that such reading or personal attendance would probably be detrimental to his mental or bodily health. The removal of the guardianship shall be subjected to the same mode of procedure as its appointment.

"19. Insane persons shall be made responsible, in a civil suit, for any injury they may commit upon the person or property of others; reference being had in regard to the amount of damages to the pecuniary means of both parties, to the provocation sustained by the defendant, and any other circumstance which, in a criminal suit, would furnish ground for mitigation of punishment.

"20. The contracts of the insane shall not be valid, unless it can be shown either that such acts were for articles of necessity or comfort, suitable to the means and condition of the party, or that the other party had no reason to suspect the existence of any mental impairment, and that the transaction exhibited no marks of unfair advantage.

"21. A will may be invalidated on the ground of the testator's insanity, provided it be proved that he was incapable of understanding the nature and consequence of the transaction, or of appreciating the relative values of property, or of remembering and calling to mind all the heirs-at-law, or of resisting all attempts to substitute the will of others for his own. A will may also be invalidated on the ground of the testator's insanity, provided it be proved that he entertained delusions respecting any heirs-at-law calculated to produce unfriendly feelings towards them."

Dr. Bucknill's Letter.

There is another point in regard to the supervision of the insane, which has not been considered by the writer, but which may become of importance, as our communities grow in wealth, if indeed it is not such already. It is a matter which the customs of England made necessary in very early days; and, although we should not be likely to adopt precisely the same method to accomplish such an end, it has seemed best to give an account of what has been done there in the following interesting and important letter from Dr. Bucknill, for many years Lord Chancellor's Visitor, and still earlier a superintendent of large experience:—

"39 WIMPOLE STREET, W. LONDON,
"November 28, 1876.

"MY DEAR SIR:—You have set me by no means an easy task, but I will endeavor to give you at least a sketch of the function of the Lord Chancellor's Visitors of Lunatics.

"It seems quite correct to say that the charge and control of the Lord Chancellor over lunatics is derived from feudal custom, under which the Crown assumed, as part of its prerogative, the care and custody of those who from want of understanding were incapable of taking care of themselves. This royal prerogative existed before the statute of 17 Edward II., called Prerogativa Regis, which is declaratory only. [See Elmer's Practice in Lunacy.] And although Elmer thinks that the sovereign acted in this matter as *parens patriæ*, it seems more probable that this power was assumed as the head or chief of the military force. A lunatic vassal not being able to render that service upon which the tenure of his land depended, in consequence of his being *non compos mentis*, the sovereign assumed, for the time being, the direct control of his property, most property in those ages being in the form of landed possessions.

"I do not think that I need trouble you with any account of the manner in which the Crown deputes its authority over lunatics, under the sign manual, to the Lord Chancellor, assisted in later years by the Lords Justices of Appeal, nor with the somewhat nice and difficult question of the point where matters in lunacy cease to be under the royal prerogative and come under the ordinary jurisdiction of the Court of Chancery.

"The control and custody of lunatics by the Lord Chancellor under the sign manual, is now regulated by several Acts of Parliament, called the Lunacy Regulation Acts. The earliest of these is dated July 24, 1833; the second, August 15, 1853; and the third and last, August 7, 1862.

"The most important officials whose powers are created and defined under these Acts are the masters in lunacy, whose duty it is to preside, as judges under the great seal, at all inquiries as to the soundness or unsoundness of mind of any person alleged to be of unsound mind and incapable of taking care of himself and his affairs. This inquiry is called an inquisition, and takes place in consequence of an order to that effect of the Lord Chancellor, which order is the result of a petition from some person or persons interested, or of information given to the Lord Chancellor, that a certain person, being of unsound mind, has property which is not properly protected.

"In the initial stage, all these proceedings have reference to the care of the property, rather than to that of the person of the lunatic. After the person has been found lunatic by inquisition, the master has to ascertain what property he possesses, and who are interested in it as the heir-at-law and the next of kin. They have to devise a scheme for the proper care and expenditure of the property, and for the proper care and treatment of the lunatic, and for this purpose they nominate two very important officials in each case, who are respectively called the Committee of the Person and the Committee of the Estate. As a general rule, the Committee of the Person is the next of kin or some one who has an interest in the continuance of the life of the lunatic, while the Committee of the Estate is the heir-at-law, who naturally has a strong interest in the protection of the property, and, as may be expected, these interests very frequently conflict.

"The Committee of the Estate receives the proceeds of the property, hands over to the Committee of the Person so much of it as he may be ordered to do by the court, for the maintenance of the lunatic, and accounts for the whole to the Master in Lunacy.

"The Committee of the Person has the charge and care of the lunatic and of his treatment. He ought to expend upon his care, treatment, comfort and pleasure the whole of the moneys he receives for that purpose. He enjoys a very wide liberty and choice as to the manner in which he discharges the duties he has undertaken, and he is exempted, in many important respects, from the operation of the lunacy laws as they apply to persons who are of unsound mind, but have not been so found by inquisition; for instance, he has the power of placing the lunatic in any asylum without medical certificates. It is the main function of the Lord Chancellor's Visitors to ascertain the manner in which the Committee of the Person discharges his duties and to report them to the Lord Chancellor.

"The appointment and powers of the Visitors were first enacted in 1833, 3 and 4 Guilielmi IV., under which, section second, two physicians and one barrister were appointed for the purpose of '*superintending, inspecting and reporting upon* the care and treatment of all persons found idiot, lunatic, or of unsound mind by inquisition.'

"The visits under this statute were only once a year, and the superintendence, therefore, could not be very stringent.

"Twenty years afterwards another statute, 16 and 17 Vic., cap. 70, further defined the duties of the Visitors, and constituted them into 'a board for their mutual guidance and direction in matters connected with the visitors of lunatics,' and at the same time subjecting them as to the times, rotation and manner of their visitations to the *general orders* of the Lord Chancellor, which general orders, often having been laid before Parliament and not having been objected to by Parliament, then acquired the force and validity of law.

"Such general orders were made and issued on the 12th of January, 1855, by Lord Cranworth, the then Lord Chancellor, with the advice and assistance of Lords Justices Knight, Bruce and Turner; and notwithstanding the important alterations made in lunacy regulations by the statute of 1862, these general orders of 1855 still form a main part of the law under which the visitors must act.

"The second and third of these general orders are the most important, and are as follows:—

"'2. That the medical visitors of lunatics do on each occasion of visiting any lunatic, inquire and examine whether such lunatic is maintained in a suitable and proper manner, having regard to the then existing amount of the allowance ordered to be paid, and the then existing scheme approved of for the maintenance of such lunatic; and also, whether having regard to the then fortune and income of such lunatic it appears expedient that any, and what, addition should be made to his comforts, or any, and what, alterations should be made in the scheme for or manner of his maintenance.

"'3. That if the said visitors shall, on such inquiry and examination, consider that the lunatic is not maintained in such suitable and proper manner as is aforesaid; or that the allowance provided for his maintenance is not duly applied; or that any provision in the scheme for his maintenance, either for his personal comfort or enjoyment, or otherwise, is not duly observed; or that any addition to the comforts, or any alteration in the manner of the maintenance of the lunatic should be made, to which his then fortune or income is capable of providing, they shall forthwith make a special report, stating such their opinion, and the grounds thereof to the Board of Visitors.'

"The fourth order directs that the Board of Visitors shall consider the report made to them by the individual visitor, and, if they think fit, refer it to the masters, 'or take such other steps therein as may appear to them to be expedient.'

"The fifth order directs that the masters may investigate any such report, and make such report to the Lord Chancellor as they 'may deem proper.'

"In 1862, a new Act of Parliament was passed, under the old title of Lunacy Regulations, 25 and 26 Vic., cap. 86, by which the visitations to Chancery lunatics living in private houses were increased from once to four times a year, the duties of the visitors being left otherwise very much as they were fixed by the earlier statutes and defined by the general orders which I have quoted.

"These duties, as fixed by the statutes, by the general orders, and by the direction of the Board, may briefly be defined as follows: England and Wales are divided into three districts, each of which is taken by each visitor in rotation; that is to say, for two consecutive visits to patients living in private houses.

"Each patient living in a private house is visited once in each quarter of a year, each patient living in an asylum is visited once a is distinction is made by the statute of 1862, no doubt, ound that all lunatics residing in asylums are also visited mmissioners in lunacy and in the provinces by justices of , acting, either as visitors of licensed houses or as visiting f county asylums, whereas lunatics residing in private e visited only by the Lord Chancellor's visitors.

visitors have to inquire and report upon these several The state of mind of the lunatic. 2. His bodily condi- His care and treatment, having regard to the due provision ts ordered for him by the court and to the amount of his

erything is satisfactory on these heads, they have to report the Lord Chancellor direct; but if on the contrary, they nake what is called a special report, which is made, in the nce, to their board, by whom it is dealt with either; (1) by e committee before them, to whom the fault found is com- l, and by whom, in many instances, amendment is promised ed out; (2) by referring the report to the masters, who e powers of control over the committees, deputed to them ord Chancellor; (3) by reporting directly to the Lord r himself.

e great majority of cases the special reports of the visitors ence to some neglect of duty on the part of the Committee rson by which the lunatic suffers; and, in the event of the e proving refractory to the reasonable demands of the he Lord Chancellor may, as a *dernier ressort*, dismiss him office. In a smaller number of cases the special report has to an inadequate allowance made from the estate for the nce of the lunatic, and in another class of cases the special ave reference to the recovery of the lunatic, in which case er lunatic has to present a petition to the court that his n may be superseded. Such is the system which you ask plain,—not a very simple one I fear you will think,—but merits or demerits I do not feel that I am in a position n opinion.

"I am, my dear Doctor Folsom,
"Yours very sincerely,
"JOHN CHARLES BUCKNILL."

CERTAIN ASYLUM NEEDS.

Education in Hygiene.

common opinion that purely mental exertion is the mmon predisposing cause of disease of the mind, especially when joined with any of the three "causes" most frequently assigned in the reports of our insane asylums; namely, heredity, intemperance, and ill-health. The first authorities, however, consider that such is not entirely the case; that emotional excitement, disappointed hopes, or some form of egoïsm are more frequently at fault, and that the best preventive of mental disease, even in those predisposed to it, is education, or wisely directed intellectual activity, leading to a knowledge of the proper ways of living.

Although essentially a disease of high civilization, and not prevalent largely where there is little competition for the prizes of life, or where the struggle for existence involves the exercise of muscles rather than of brains, insanity prevails most, other things being equal, where thought stagnates. Even Pinel speaks of its rarity among those professions giving exercise to the intellectual and not the emotional faculties.

"The more joints, the more rheumatism," was the apt criticism on one of those marvels of workmanship that lately came from the hands of one of our microscope makers. In like manner, as our civilization becomes more complex, as our capacities for enjoyment intensify, so is the keenness of our suffering sharpened, so do the requisites for moral, mental and physical health become more numerous; and, unless a sound education gives us a correspondingly greater knowledge of that wonderful mechanism, the human body, disease of all kinds must increase.

If, therefore, the mere healthy development of the brain in itself conduces to preserve its health, how doubly important that education becomes when it is made to teach general laws of nature, and the special course to be taken in each individual case to preserve bodily and mental health. But what is done in our high schools, our colleges, our medical schools, or even in our asylums, to accomplish such a desirable result? We must answer, almost absolutely nothing.

Even in our asylums, where the medical staff are busied with a multiplicity of routine duties, and have time for little else, the convalescents and sufferers from chronic illness not only do not get that information which many of them would gladly receive, and which would help them to maintain their health to a sufficient degree to remain at home when discharged, but they are not even taught the evils of persisting in a diet which surely adds to their chances of a relapse, or in habits as regards exercise, clothing, ventilation, etc., which certainly do not promote health. As a natural consequence, it often follows that they go home, refuse advice, continue in their erroneous methods of living, follow a course whose logical result is a relapse or recurrent attack and return to the asylum with diminished chances of a permanent cure.

Of course, it is not meant to say that there are not many who will neglect all advice, others who are mentally incapable of sufficient persistent effort to follow wise counsel, and a certain number whose predisposition to disease is so great as to render them unable to bear the trials common to the lives of most people without breaking down; but experience justifies the statement that even with those who have had one attack of mental disease, a second may, in some cases, be warded off by wise methods of living.

Better Hospitals and Trained Nurses.

We recognize the fact that insanity is a disease of a purely material organ, and yet we go on building our hospitals for treating it essentially on the same plan as when they were simply regarded as prisons for confining persons dangerous to society; we do not provide a single ward* for the care of those who need to be removed from the boisterous noise, occupation, and amusement, which are the only salvation for others to prevent their relapsing into incurable insanity; and more important still, although we have many excellent attendants, of whose faithfulness and intelligent devotion to their work it is impossible to speak without some degree of enthusiasm, we lack some system of training them for their work.†

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* This is considered of great importance elsewhere. We find the following criticism by the Commission in Lunacy on an English asylum in 1875: "In connection with matters relating to the treatment of the sick, we desire again to draw attention to the want of a ward set aside as a hospital, and furnished with proper furniture and appliances for the patients laboring under bodily disease."

† In many establishments in France, as early as 1837, the attendants were required to have undergone a system of training previous to their appointment; and attendants were trained for other asylums at the retreat in York, forty years ago. In Scotland, the commissioners keep records of all attendants who have been discharged from any asylum for any gross fault, so that they cannot be employed again elsewhere, in ignorance of that fact.

In many of our asylums, we have not a single educated nurse* who knows how to care for any severe illness confining patients to their beds.

This difficulty of getting trained nurses and attendants is one of serious moment. A dozen years ago it was nearly impossible, and the systematic and thorough education of them for their work began only since the Crimean war. Dr. Bell's "Directions for Attendants" is the earliest treatise which I have been able to find devoted to this important subject. Dr. Woodward published a similar one for the Worcester Asylum in the same year (1839) several years before Conolly's "Teachings for Attendants on Lunatics," and a dozen years before Dr. Kirkbride's and Dr. Curwen's. Florence Nightingale's "Notes on Nursing" came much later. It is not likely that these books have been heard of by many of our attendants, and it is possible to count on the fingers of one hand the places where this matter is arranged on a generally satisfactory basis.

In two of the large hospitals of England (the London and St. Bartholomew's) the nurses have only lately been relieved of the scrubbing. In our asylums we expect one person to be nurse, attendant, night-watch, companion to the patient, and wash the windows and scrub the back-stairs, all for a less sum than we pay to a second-rate cook.

Dr. Maudsley and Dr. J. Crichton Browne have lately set on foot a plan for female nurses in male wards in insane asylums, and it is said "the presence of women nurses in the male wards is found to be much more effective in restraining outbursts of violence, abusive language and offensive habits than the presence of male nurses."

At the Mt. Hope Asylum, near Baltimore, the patients, nearly three hundred in number, are managed entirely by the sisters of charity. Physicians make regular morning visits, but none are resident. In each male ward there is one male attendant, subordinate to the two sisters in charge of that ward. The sisters say, themselves, that they have no serious trouble even with the most violent patients, and that, indeed, excitement in the men is even more readily quieted by them than by the male attendant. When visited, without warning, by the writer a few months ago, the wards were in excellent order, quiet, and without that untidiness which is usually found where men have sole charge.

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* In many European hospitals there are both nurses and attendants.

There are some admirable features about the asylum, which are certainly not common in this country. Some of the rooms of the convalescents and quiet chronic cases have windows without guards, as is the case in the passage-ways, in the pleasant chapel, entries, and in the cheerful entertainment hall, where patients likely to harm themselves or others never go without having attendants close at hand, if at all; a prison-like appearance is thereby avoided, wherever it seems easy to do so. The sisters devote themselves so closely to their charge, that they consider high fences and "airing-courts" also unnecessary. We might well learn an important lesson from their work, which has been going on quietly for nearly half a century, since it was begun under the wise and thoughtful direction of the late Dr. Steuart.*

In providing for the chronic, incurable insane, separating them from society, which is strong, and from the actually ill, who are weak, the Willard Asylum has proved a success; but nothing satisfactory has yet been done by us for those of the curable who are depressed by their ordinary surroundings in our asylums, as at present managed. Classification does not accomplish the desired result, where one roof covers such a diversity of disease and of mental condition; but it would be a great error and injustice to make curability alone the basis of division; for many of the chronic insane maintain their intelligence and self-respect, often help and cheer the curable, and would suffer if placed with dements. Those who are so far demented as to have lost their human identity should manifestly be kept away from the rest, just as much as from children or any others likely to be unfavorably influenced by association with them. With the comparatively small number whose condition is for a while a matter of some question, it would not be difficult to give them the benefit of the doubt.

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* See page 313. The Mount Hope Hospital was built by the sisterhood who were originally in charge of the Maryland Hospital under Dr. Steuart.

MEDICAL EDUCATION.

The matter of medical education is with us, at the present time, a most pressing one. Its importance has long been recognized. Governor Adair in his message to the General Assembly of Kentucky, in 1821, urged as one reason for the establishment of a state insane asylum, that it "would prove highly beneficial to the medical school, which would, in time, repay the obligation by useful discoveries in the treatment of mental maladies"; a prophecy which it is needless to say has not been fulfilled.

Thirty years later, Dr. Pliny Earle, after his return from Europe, urged strongly the necessity of establishing professorships of mental disease, and finally that has been done in a few of our leading medical schools; although, in one of the best, the lectures were first delivered in private parlors, as the faculty did not deem them of sufficient importance to be given at the college.

In none of our medical schools, however, except in New York, is disease of the mind taught clinically by observation, although there is not one of importance in Europe where it is not so taught. As has been well said by Dr. Gray of Utica, "the evils of this lack of attention to the pathology of insanity, and want of knowledge of the true character of the disease, are much greater than the public are aware of. If the result was only an indifference to the whole subject by medical men, it would be bad enough, but it is far worse. It is the application of a false theory, which not only deprives the sufferer of proper treatment, which he has the right to claim, but subjects him to wrong and injurious treatment, and especially to neglect of remedies in the beginning when the disease is in its curable stage."

Formal lectures on such a subject are of just as much practical use as in any other disease, and of no more. Without the hospitals of Paris, Vienna and Berlin, and the instruction at the bedside and in the dispensary all over the civilized world, Louis, Laennec, Oppolzer, Skoda and Traube might almost as well not have lived; their brilliant discoveries in the detection of the different forms of thoracic disease would have scarcely helped the world at large, and we should

ne on treating the cough which needs rest in bed
ame way with that which warns us to drive our
out into the open air, thereby sacrificing many a life
e now save.

ague nomenclature, the supposed difficulty of diag-
d treatment, the assumed ground that insanity can be
only by persons peculiarly gifted, and in nearly all of
s in buildings specifically constructed, has conduced
mission on the part of our universities. We have
that nature makes no leaps, and that there is no pos-
e of demarcation between sanity and insanity; that
e-half of the recent cases get well, of whom a little
n half remain so; that hallucinations of sight and
may be the genius of inspiration in Joan of Arc and
isive evidence of insanity in somebody else; that
æsar, Mahomet and Napoleon suffered from a mental
by virtue of which persons are held not accountable
ler in modern courts; that a false belief is not neces-
delusion; that Martin Luther was not insane; that
ippinas, Neros, Caligulas and Tiberiuses of history
robably only the monstrosities which occasionally
n modern times; that insanity was increased by the
s, the Reformation, the American and French revo-
the Retreat from Moscow, the Commune, the religious
n Edinburgh, and diminished in the manufacturing
of England when the "hard times" compelled the
to drink less gin.

ow does all this interesting information help us, when
on our diplomas is scarcely dry, and we are called
sign a paper* which will send a woman to an insane

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r York State there is a restriction, whereby only those physicians thought
fied to do so, are allowed to sign certificates admitting persons to insane
The law on the subject is as follows:—

Section 1, 2, 3, *of Chapter* 446 *of the Laws of* 1874.

1. No person shall be committed to or confined as a patient in any
blic or private, or in any institution, home or retreat for the care and treat-
e insane, except upon the certificate of two physicians, under oath, setting
sanity of such person. But no person shall be held in confinement in any
m for more than five days, unless within that time such certificate be
y a judge or justice of a court of record of the county or district in which
lunatic resides, and said judge or justice may institute inquiry and take
any alleged lunacy, before approving or disapproving of such certificate

asylum for life, or deprive a man of the power t will, when we cannot for our lives tell the differe *folie circulaire* and general paralysis, when we ca nize many of the simplest forms of mental dise early stages, and when we do not know wheth treatment consists in sending our patients to the an asylum or for a tramp among the hills, or whe as well or better be cared for at home?—an uncert deprives many of the benefit of early treatment. tainly as rational to treat common cold and consu because they affect the same organ, as to say that forms of mental disease should all be subjected general rules.

Insanity, in the reports of our asylums for th the disease of which so many recover, so many so many die; but it would be fully as rational to s of all patients entering our general hospitals wi and "pain in the chest"; for insanity is really only of disease, or perhaps a combination of sympton disease underlying it is often incurable from its and often readily yielding to treatment. The diff often require as different treatment as brain fev monary consumption.

This confusion of names and of things, has undo a seriously prejudicial effect on medical education large degree the direct result of this very want instruction in our medical schools.

It cannot be denied that the sciences are each y a greater part of the student's time, already too s

and said judge or justice may, in his discretion, call a jury in each c the question of lunacy.

§ 2. It shall not be lawful for any physician to certify to the insani for the purpose of securing his commitment to an asylum, unless sa of reputable character, a graduate of some incorporated medical colle resident of the State, and shall have been in the actual practice of hi at least three years, and such qualifications shall be certified to by court of record. No certificate of insanity shall be made except examination of the party alleged to be insane, and according to form the State Commissioner in Lunacy, and every such certificate shall more than ten days prior to such commitment.

§ 3. It shall not be lawful for any physician to certify to the insa son for the purpose of committing him to an asylum of which the s either the superintendent, proprietor, an officer, or a regular profes therein.

e must do ; but, in adding to our requirements for grad- we have only begun to drop the lumber which medicine, ogma, had to carry. Of what importance is it, for e, to the busy physician, to know that the morphine he injects in his patient's arm, is from the *papaver* *rum*, and not from some other *papaver*, and to be able all the complex processes by which it is prepared for What cares he from which one of the *scrophulariaceæ* the drop which quiets the too rapid pulsation of the These things are all very well—the expert must know but are they of sufficient importance to exclude a prac- udy of vitally important problems which meet every an face to face in every year of his practice?

e have time for only the necessary and fundamental es, why not recognize the fact that the physician simply his education in the medical school and leave out of the details which only a specialist is required to to be filled in by reading afterwards? With four thou- eople in our State suffering from mental disease, and e superintendent of every insane asylum in the country ining that curable insanity is almost universally neg- n its early and curable stage, are we wise to exclude ful study from our list, in order to have more time to gate the action of digitalis and belladonna on rabbits nea pigs, or to learn difficult surgical operations which ill not see and only a few experts will ever perform? ing the word hygiene in the largest sense," said the . Parkes, "it signifies rules for perfect culture of mind dy." In this maxim, and in its observance, we must r our greatest help in convincing the community that , like other diseases, is to a great degree preventable, t to cure or to prevent it, we must first study it.

gratifying to find that such a serious defect in our l education is attracting the attention of thoughtful In a recent report by one of our most distinguished ians, we find these words: "A third branch of medi- hich is not taught in our schools, is the diagnosis, ent and jurisprudence of insanity. I do not know if be possible to deal with this subject in this university, ould keep this urgent want in mind, and the possibility

of making connections with some public or priv
ments devoted to the care of the insane, whic
the necessary facilities and receive more than a c
benefit." *

No truer word has been spoken than that "In
of the price that we are paying for the imperf
civilization and the incompleteness of our educat

SUMMARY.

If our century's work seem to any to offer n
say in favor of our past, when we have been s
ions in the construction of asylums, without di
amount of insanity or increasing our cure-rate,
offers many signs of encouragement. We hav
takes, it is true, and we are still in doubt as to
tant points; but earnest people are at work ov
civilized world, and more and more certainty is r
year.

That we have started from as small beginnin
made no more progress in other branches than
may readily be seen by consulting John Howar
prisons, hospitals, etc., in Europe, published in
excellent treatise on "A Century of Nursing,"
of the hospital committee of the State Charities
tion of New York, issued during the past year.

If we go beyond this century, we shall see th
been in modern times four great epochs in th
the treatment of insanity.

(1.) The abolition of the theory of posses
spirits—a work of humanity, in which St. Vin
was the great mover, two centuries and a half a

(2.) Pinel's reform—also essentially humanit

(3.) The adoption of the idea of the curabi
ity; the establishment of the *heil-anstalten* i
Esquirol's visit to Gheel and his theories of asyl
tion; the laws in England compelling the severa

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* Johns Hopkins Hospital, Reports and Papers relating to Constr
ization, No. I. By John S. Billings, Asst. Surg. U. S. A.

† Relation of Education to Insanity. By Edward Jarvis, M. D.
the United States Commissioners of Education for 1871.

for their pauper insane, and establishing a lunacy
ion; Rush, Wyman, Bell and Kirkbride in asylum
tion and management; Ray and others in the juris-
e of insanity; the reduction of mechanical restraint
nited States forty years ago to a point below that in
lsewhere; and finally, the abolition of mechanical
begun by Hill and made a principle of treatment by
This may be called the practical movement, arising
nd, France, and later in Germany, for a while reach-
highest point in the United States, now best in Eng-
l Scotland.

The general acceptance of the somatic and rejection
sychic theory of insanity, by establishing psychology
basis of physiology and pathology—a scientific move-
ticipated by John Hunter, begun by Bichat and Es-
arried out by Griesinger and Virchow.

nity is now the basis of treatment everywhere, no-
nore laboriously and studiously sought for than in the
lums of our own country.

vork of the future, the *rational* movement, will be
nation to contribute its best, and for all to unite
y, science and art in solving problems now satisfac-
et by none.

istory of mental disease shows a steadily progressive
ment of rational views in its treatment. So long as
nspiration was thought to be its cause, the insane were
as seers and prophets; and, as such, their influence on
has been a potent one. Under the later theory of the
Ages, they were burned or hanged by the courts, and
l by their custodians, the monks. After St. Vincent
, violence and force in their treatment gradually gave
deliberate imposture. For a while, the satirist might
d that their care under the doctors consisted in show-
what was good for a sane man was bad for one insane;
used to be taught, even from the professors' chairs,
ients were benefited by continual morbid surround-
hile the doctors must make a special exertion under
e circumstances not to become insane themselves; that
for the chronic insane would be fatal to the reason

of the curable cases which would be inevitabl them, but that it did no harm to subject acute daily influence in large asylums, and that the peculiar exemption from diseases and influen affecting well people.

It was a long time before we made our practic spond with our knowledge that insanity is a diseas by no means done it fully yet; but now physici they must gain the respect and confidence of the as they do with their other patients; and Dr. Far eight years' experience in the science, which he itary statistics, says, in his thirty-sixth annua fact, as far as is known, a lunatic remains as subj constitutional and various local diseases as sane

In the majority of cases, a well arranged asyl place for an insane person than his home; but might be made much better than they are, if w part of the money now expended to gain a quest tectural magnificence in providing more atten improving our facilities for medical treatment.

To get the benefit of such improved asylu selected cases, our general practitioners mu mental diseases, as the majority of patients con exclusive observation in the early and more c When our medical schools have given them th may we not fairly expect an improvement in our treatment, corresponding with what has tak early stages of pulmonary consumption and Br especially when the superintendents, who are dened with routine work, have more time to d strictly medical duties?

It cannot be said that this is a subject which paratively few persons. Such is the general im out doubt, and most people look upon insanit "hereditary," to which not many are liable. our highest authority said to the trustees of a "From the sad disorder which is to be treate walls, no one has any privilege of exemption.

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* Registrar-General's Report for 1873, page 221.

† Address at Danville, by Isaac Ray, M. D., 186

ie or birth, no measure of strength, no exercise of
may be able to save you from the fate of others once
ikely to meet it as you. Or, if you escape person-
stroke may fall on child, parent, or neighbor with far
rrow than if it fell on yourself. You, therefore, are
iterested in having it perform its allotted service suc-
, and are bound, as far as in you lies, to promote this
n opinion fully sustained by Dr. Kirkbride, who says,*
y is a disorder of the brain, to which, under certain
ncies, every one is liable." Hagen, too, after exhaust-
rches extending over a period of twenty-five years,†
uded that the influence of heredity, although consider-
till much less than has usually been supposed. The
ge number who marry wisely, and do not transmit
rmity to their offspring, do not usually appear in our
l tables.

of our most experienced and best-informed alienists
the manifold diseases of the mind no more likely to
nitted to offspring than Bright's disease and pulmon-
umption. The evidence is strong, also, that they
s readily eliminated from families by wise marriages
cious modes of living. In either disease, of course,
cases where any marriage must be looked upon as
but they are not so universal as has been sometimes
l, and the transmission to descendants of what has
netimes called the insane temperament has given to
d many men and women of genius, whom we could
spared.

as late as the time of the Ptolemies, the plague was
i in Egypt.‡ One hundred years ago, it was thought
ary part of modern civilization, and now, under a still
ivilization, the area over which it may be feared is
g from year to year. A similar result may be fairly
with regard to disease of the mind.

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for 1876.

che Untersuchungen über Geisteskrankheiten. Erlangen, 1876.

en Hungertyphus und einige verwandte Krankheitsformen, von Rudolph
Berlin, 1868, p. 53.

HEALTH OF TOWNS.

DIPHTHERIA IN LYNN,

By J. G. Pinkham, M. D., Correspondent of the Board in Lynn.

DIPHTHERIA IN SALEM,

By A. H. Johnson, M. D., Correspondent of the Board in Salem.

DIPHTHERIA IN LOWELL,

By F. Nickerson M. D., Correspondent of the Board in Lowell.

REPLIES FROM CORRESPONDENTS:

NCLUDING NOTES OF AN EPIDEMIC OF TYPHOID FEVER IN SOUTH DENNIS,

By Dr. C. M. Hulbert, Med. Corr.

HEALTH OF TOWNS.

DIPHTHERIA IN LYNN IN 1876.

tigating the nature and causes of the epidemic of diph-
ch has just visited Lynn with such fatal violence, regard
ad primarily to three special points, viz.: 1. The natural
under which the disease has prevailed. 2. The artificial
under which it has prevailed. 3. Its contagiousness.
hought that more would be gained by limiting the inquiry
n to these questions, which seem to lie at the foundation
lic measures of prophylaxis, than by attempting to go
hole range of interesting subjects connected with a disease
read and fatal as to demand the most thorough scrutiny
s in any way bearing upon it.
n has been, in making up this report, to present only care-
mined facts, and present them in such a way that the
y be able to form his own opinions as to the correctness of
sions derived from them.
rces depended on for information have been: 1. Accounts
by physicians. 2. The public record of deaths. 3. A
nspection of infected premises and localities.
way knowledge has been obtained of 518 cases occurring
year. Complete reports were made by sixteen physicians
ce. The ratio of fatal cases to the whole number for
plete reports was one to 4.9. Allowing the same to have
n the practice of the physicians who made no report, a
of 96 cases is estimated. This brings the whole number
, which cannot be far out of the way. The estimated
of Lynn for 1876 is 33,550.
rk of personal inspection was performed mainly by Dr. S.
, to whose faithful and efficient assistance your corre-
is much indebted. Acknowledgments are due also to the
who have so cheerfully furnished full information in

regard to their own cases. Without their generous a
would have been impossible.

The table which follows contains an account of
selected, but taken at random, and believed to be a
the whole. Of the 104 cases, 27 were fatal, or one to e
This is a larger ratio of fatality than the average of t
explanation of this fact is found in the circumstance
for the table were collected early in the summer, and
vestigated were, therefore, mainly those occurring in
high mortality. When the dates of the cases in the t
into consideration in connection with the monthly
fatality given in the chart, it will be seen that the e
misrepresented in this particular.

The principal facts which we have attempted in th
forth have been those pertaining to the natural ch
localities in which the disease prevailed, and the hygi
of infected premises and their surroundings with re
drainage, the water-supply, privies, refuse-heaps, ba
etc. In order to make the data as reliable as possibl
dence has been rejected in regard to all points which
mined by a personal examination.

In a large number of cases time would not allow th
necessary to enable us to tabulate them. This led to
tion of the map, which is believed to show the dist
the fatal, and at least four-fifths of the non-fatal c
during the year. Owing to the relatively large size
ing marks, it was not possible to show by their me
spot of occurrence of every case. The object has
by indicating in a general way the locality. The
shown by a spot, the non-fatal by a cross. Marsh la
sented by the deep green tinting, less degrees of damp
the lighter shades. Mr. I. K. Harris, who made th
been for many years city engineer and familiar with
the town, was able to supply the very valuable kno
for this part of the work.

The larger map given in connection with the repo
itary condition of Lynn, can be referred to for sewer
land above the sea level, and other facts.

Under what Natural Condition has Diphtheria preva

Upwards of 80 per cent. of the cases given in t
in the valleys of brooks, or near marshes or bodies o
the soil is usually more or less damp. They were ne

ve been
, applies
the first
the dis-
brooks;
ion the
se. In
line of
Avenue,
rtained
o every
reached
se was
city the
bitants;
section
shown
f it is
To the
ears by
nded on
Broad
f Broad
ay as to
y a line
Chest-
liberal
cases of
139, or
t of the
h Pond,
e of the
nd dry.

ation is
inity of
at strip
and the
Common

to have
the con-
severely

UNIV. OF MICH.

irts of the town, where no means of artificial drainage have been ced. The same statement, in a somewhat modified form, applies e larger number of cases represented on the map. At the first e it might appear that in the eastern part of the town the disvas more prevalent at a distance from marshes and brooks; careful study of the subject, taking into consideration the ty of the population, proves that this is not the case. In large tract lying north of Lewis Street, east of the line of ham and New Chatham streets, and south of Western Avenue, is a population of 1,858. The number of cases ascertained curring here during the year was 100, or about one to every the inhabitants. The disease may be said to have reached naximum prevalence in this region, for nowhere else was ratio of cases to the population so large. In the city the of ascertained cases is one to every 65 of the inhabitants; certained and estimated cases, one to every 54. The section e mentioned is wholly undrained, and contains, as shown he map, much damp land. The inhabited portion of it is y all in the valley of Stacey's Brook and branches. To the vard of this is another more populous tract which appears by nap to have been severely visited. Regarding it as bounded on east by Chatham Street, on the south by Lewis and Broad ts, on the west by a line drawn from the junction of Broad Exchange streets to High Rock Street, in such a way as to Hutchinson's Court on the right, and on the north by a line n from this point along the course of Adams Street to Chest- thence to the junction of Collins and Chatham streets, a liberal nate of the population would be 6,236. The number of cases of heria occurring during the year within these limits was 139, or t one to every 45 of the inhabitants, less than half that of the on to the east. This tract contains Silver Lake, Goldfish Pond, some spots along Essex Street, damp from the drainage of the ; but the greater part of it may be described as high and dry. however, mostly undrained.

respect to the western part of the town, no calculation is ed to exhibit the preference of the disease for the vicinity of hes and brooks. One needs but compare, on the map, that strip nd lying between Summer Street, Western Avenue, and the h, with that lying above, between Summer and North Common ts, to be convinced of the truth of these statements.

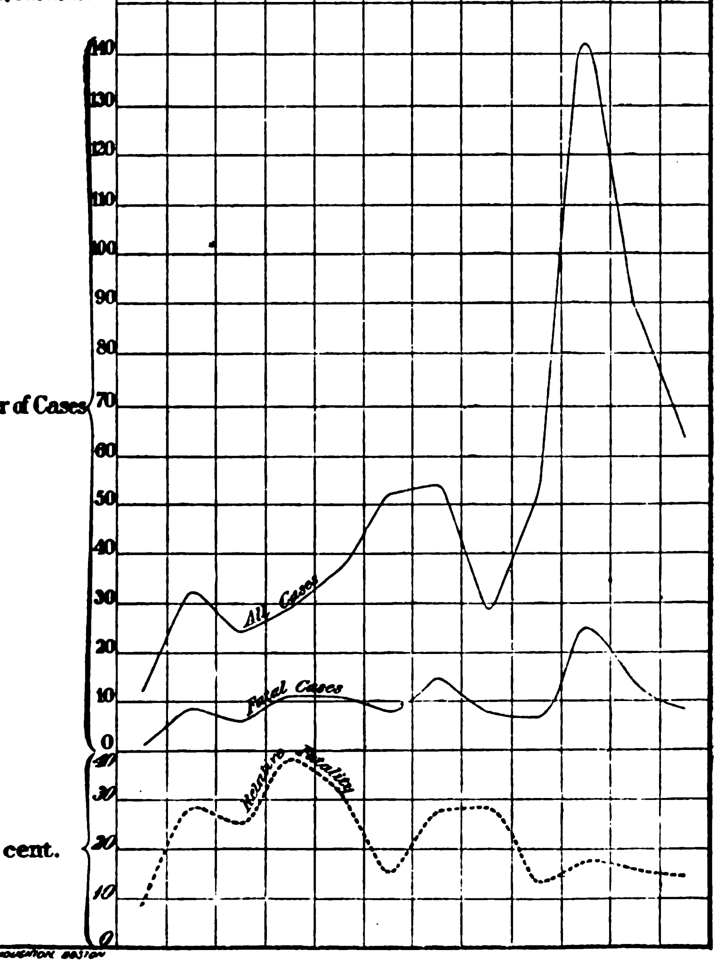
e height of the land above the level of the sea appears to have fluence on the disease, except so far as it determines the conn of the soil. In several of the sections which were severely ed there is a clay subsoil, and the water-table is high.

The chart which follows shows the monthly pr
disease throughout the year, together with the averag
the number of fair, cloudy, and stormy days, the pr
the rainfall, and the mean relative humidity of the
initial letter is written above another, as $\frac{E.}{W.}$, it signif
winds are about equally prevalent, the one above b
excess. The date of occurrence of 509 of the case
determined. The remaining 105 were distributed am
in proportion to the number previously ascribed to e
done in order to preserve the proper ratio between
and the whole number. Its effect is simply to raise
of the chart, and lessen in proportion the percent
given below. The fatal cases were all determined
the public record of deaths.

In this chart October is seen to tower above all th
like a mountain-peak. It is something marvellous, t
which the disease, from its temporary decline in Au
through September up to its maximum in Octobe
off again. Over 23 per cent. of all the cases occ
ber. The minimum prevalence was in January,
than two per cent. This was almost in the very b
epidemic, and a comparison of the two months w
just. January may be described, however, as a n
ant month. It would not be unfair to compare
November, which stands next to it in point of pr
yet far below.

The former was several degrees colder than u
pleasant weather, prevailing north-west winds, a low
air; the latter was warmer than the average, had
weather, much east wind, a very large rainfall, and
was, in fact, an extremely wet, foggy, and disag
Yet during this time the disease declined very rap
not do, perhaps, to draw from this the conclusion
weather favors and disagreeable opposes the spread
but it is safe to say that the reverse of this propo
hold true. April, which gives us the maximum of
pleasant month, with prevailing north-west winds,
and dry air. September, which gives us the mini
(excepting January, which we exclude for the reaso
was characterized by an average temperature, m
easterly weather, an average rainfall, and damp a
months present very variable conditions, not alwa
same relation as in the instances cited above, to
prevalence and fatality of the disease.

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
emperature,F.	31.3	28.7	34.0	42.8	54.5	67.7	73.2	69.2	59.2	47.7	41.3	23.8
r days fair.	20	16	18	20	23	22	26	26	15	18	10	16
" cloudy.	6	6	8	6	5	5	2	4	8	9	12	9
ainy or snowy.	5	7	5	4	3	3	3	1	7	4	8	6
ing wind.	N.W.	N.W.	N.W.	N.W.	E. W.	E. W.	W. E.	W.to N.W.	E. W.	N.W.	W. E.	W.
ll in inches.	1.83	4.72	6.04	3.37	3.21	1.07	7.36	0.55	3.67	1.67	7.92	3.64
Rel. Humidity. n, U.S.S.S.	74.79	75.38	73.12	65.60	66.67	73.40	67.80	67.40	73.50	65.30	76.70	73.50



In the table given below, the seasons are compare

SEASON.	No. of Cases.
Spring,	89
Summer,	135
Autumn,	283
Winter,	107

Spring is here shown to have had the least numb
the greatest relative fatality ; autumn the greatest
and the least relative fatality. Winter and summer
in both these respects ; but the latter has a greater
ratio of fatality than the former.

Under what Artificial Conditions has Diphtheria pre

In answer to this question, it is necessary to state
has not infrequently been observed under the most fa
circumstances ; but it requires only a cursory exa
table to show that an overwhelming preponderance o
in connection with defective sanitary conditions. T
offensive privies, cesspools, sink-spouts discharging
hog-pens, etc., is in itself an argument admitting no
of the proposition that the spread of diphtheria is in
moted by the presence of filth. In comparatively f
given in the table were the appointments and surr
dwellings in all respects such as are considered fav

It is but just to state that many of the premises
things were observed were apparently clean and
owners not being aware that any defects existed
pointed out. In some instances only a close exam
them. An illustration of this may be seen in the
number 44. The house was well ordered, and the
was that everything was as it should be. But s
showed an overflowing cesspool under a bedroom w
noticeable, but sufficient at times to fill the room
odor. Three persons of the four constituting the f
theria in a severe form. Two of these slept in the
mentioned, and the other in one adjoining. This
seem to many minds a trivial circumstance ; but it sh
bered that in the search for undiscovered truth, it c
do to neglect trifles. If the doctrine of a contagiu
is now coming into prominence, be accepted, it is
the filthy sink-hole might furnish the very cond

development of the bacterium which causes the disease, and iveyance of its germs into the dwelling.

he eastern section of the city, where the disease was very ent, the night-soil deposits, which, during the hot months sent uch offensive effluvia, may have had some influence. Nearly lf of all the cases which occurred in July were within the of the emanations from these deposits, a portion of which ntirely uncovered and exposed to the sun and winds.

not only has diphtheria been apparently favored in its spread nitary conditions, but under them the relative mortality has nuch greater. Only four or five of the 27 fatal cases of ble were on premises that presented no defects either in lves or their immediate surrounding. It is not hard, also, e a similar relation between insanitary conditions and the y of non-fatal cases.

ie Waterhill District (see large map) there were, as ascer- 37 cases in all, of which 20 were fatal—upwards of fifty-four it., or one to every one and eight-tenths cases. In the Ocean t, on the contrary, there were sixteen cases and two deaths— and one-half per cent., or one in every eight. The difference marked, and can hardly be ascribed to any other cause than ll-known differences in the hygienic conditions of the two dis- If we allow to each district its proportionate share of esti- cases, the conclusion arrived at is essentially the same. The um of fatality appears to have been attained wherever damp- soil, or subsoil, was coincident with faulty artificial conditions. nstance has been reported in which the disease was thought e originated in contaminated well-water.

Is Diphtheria Contagious?

answer given by our physicians, almost without exception, to estion is yes! Certainly it has manifested during the present nic all the prominent characteristics of a contagious disease;

t has spread slowly from person to person, from family to , from neighborhood to neighborhood.

umerous instances have been observed in which individuals known exposure have been attacked.

here has been a well-marked though somewhat variable of incubation.

s in the case of diseases universally regarded as contagious, ave been peculiar sequelæ.

erve the grouping of spots upon the map. Isolated cases have ed no more frequently than during epidemics of scarlatina and

other eruptive fevers. The rule has been, that
entered a family, other cases followed the first, afte
time. Those brought into the closest relation with
were the most liable to the attack. In the majorit
attended by your correspondent, mothers of very sic
selves acquired the disease. When the father
nursing, he also in many instances was attacked,—
when his duties kept him much away from home.

The following relation illustrates the manner in w
spread: A little girl was taken with sore throat
school. Not being very ill, no physician was called,
was not recognized as diphtheria. While sick, sh
baby of nineteen months, of whom she was fond, an
four, belonging to a different family in the same hous
a week the baby was taken with unmistakable d
membrane invaded the nostrils, and death ensued
The little girl of four was taken in two days after th
the disease mildly. The mother and father were bot
soon after the baby's death. In the case of the m
brane invaded the larynx and caused much difficul
but recovery followed, as also in case of the father.
visited the family during the baby's illness, was atta
theria about one week afterwards. Thus we see that
carried from school to family No. 1, thence to famil
same house, thence to an outside family. Many acc
the above might be given.

The conclusions at which we have arrived in respe
studied may be briefly summarized as follows :—

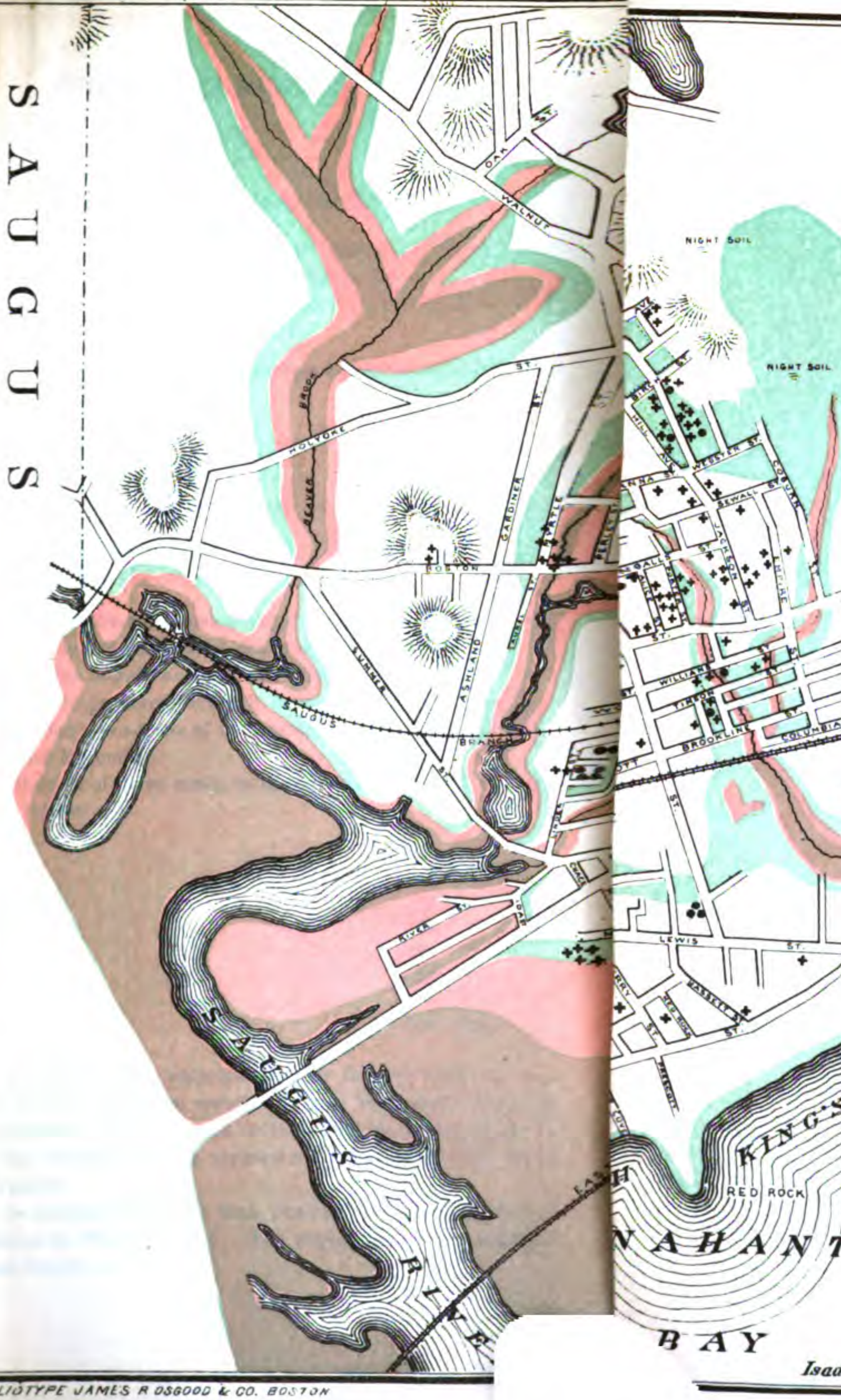
1. Diphtheria has been more prevalent near mars
valleys of brooks, and near bodies of water where th
soil are naturally damp, than at a distance from such

2. It has been most prevalent and least fatal in
prevalent and most fatal in spring ; but there appea
no constant relation between the character of the we
the prevalence or fatality of the disease.

3. Other things being equal, it has been more pr
atively more fatal where air and soil have been po
drainage, overflowing privies, decaying garbage, etc.
not subject to these conditions.

4. It has presented in an eminent degree the c
a contagious disease.

5. Owing probably to its contagious nature, it h
all kinds of soil, at all seasons of the year, under
hygienic conditions.



LIOTYPE JAMES R OSGOOD & CO. BOSTON

Diphtheria in Salem in 1876.

ıtheria has been the most prominent disease in Salem during st year, and has prevailed to an alarming degree.

ve obtained reports of 534 cases, which may be tabulated as s :—

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
cases,	18	20	24	13	21	22	24	36	37	58	126	135	534
. .	1	1	3	0	4	1	6	9	4	7	9	19	64

s it appears that the percentage of mortality from this epi- for the whole year, was 12, that the greatest fatality occurred the months of July and August, when it reached 25 per cent., he epidemic gathered strength from July onward, and that r more than three-fifths of the cases, occurred during October, nber, and December.

distribution of these cases, in the different wards of the city, en as follows :—

l 1,	142 cases.
2,	67 "
3,	66 "
4,	94 "
5,	132 "
6,	33 "
	534 cases.

ence it appears that, while all parts of the city have been vis- the disease, there are certain sections in which it has been ally prevalent,—a fact which is illustrated by the map (p. 447) ich the shaded portions represent the localities where diph- prevailed.

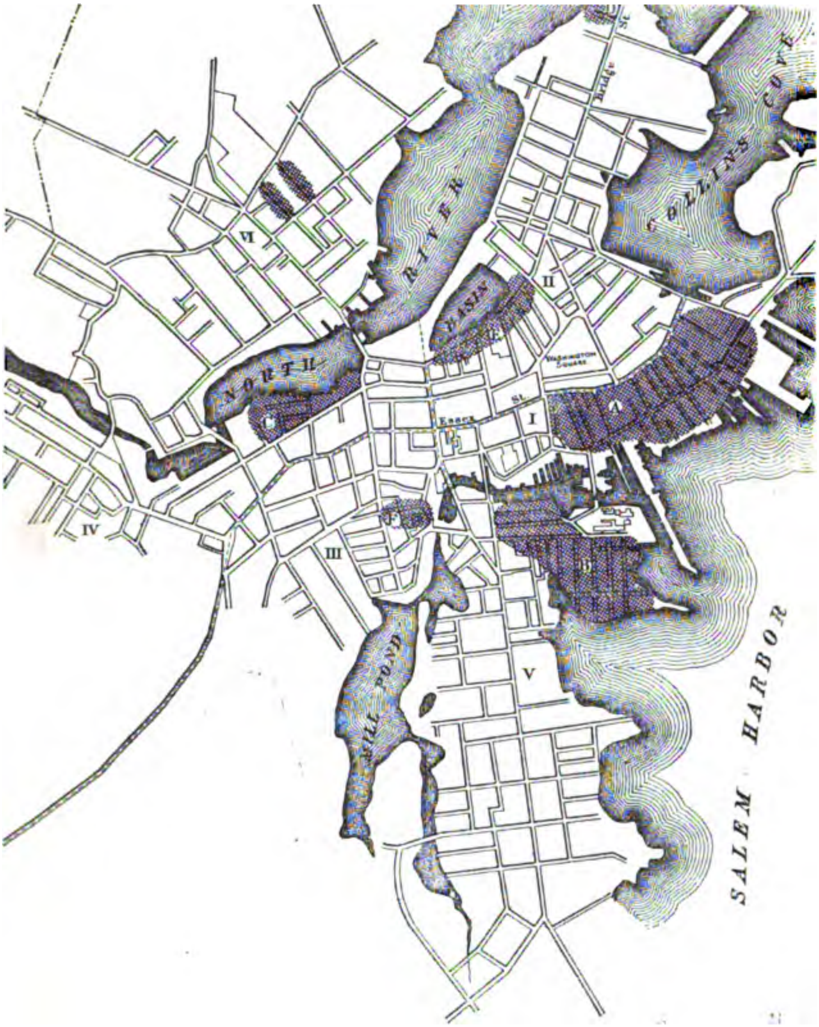
s to be noticed that more than one-half the whole number of occurred in Wards 1 and 5. The population of the different is as follows :—

	Males.	Fema
Ward 1,	2,010	2,2
2,	1,924	2,4
3,	1,515	1,9
4,	2,022	2,4
5,	2,708	3,1
6,	1,629	1,7
Total,	11,808	14,1

Ward 1 is, therefore, the *fourth* for number of po
it presents the largest number of cases of diphther
occupies the south side of the narrow peninsula w
northern boundary of Salem Harbor, together with
This neck is, for the most part, an open territory
houses, and is used chiefly as a summer resort. For
in the year, its population amounts to a few scatter
the Plummer Farm School. None of the cases rep
upon the Neck. Excluding, therefore, this portion o
territory it covers is comparatively small. If we st
more than one-third of the remainder of the ward
portion lying west of Union Street, in which only five
we have a very limited section in which 137 cases
occurred. By far the larger portion of the families
belong to the poorer classes, who are forced to occup
times crowded, tenements, and who, with insufficie
selected nourishment, undergo toil and exposure. B
to the necessary accompaniments of poverty, ma
allowed to exist which tend to aggravate the dange
when an epidemic approaches.

Only a small portion of the territory is drained.
tion of the lower end of Essex Street, no public se
of Daniels Street. Refuse-water and slops are d
cesspools dug in the yards of houses, and then allow
way through the soil; or, in many instances, they a
the surface of the yards, together with other refuse m
of the privies are mere superficial excavations in
soon become filled and noisome, and, in some insta
kept to add their bountiful preparations to welcome

Ward 5 includes all of South Salem. It embr
occupied land, and the greater part of its territo
favorably situated. The northern fourth of the ward



MAP
OF THE CITY OF
SALEM
TO SHOW LOCALIZATION
OF DIPHTHERIA.

Reference to shaded portions.

A	137	cases.
B	101	"
C	48	"
D	14	"
E	15	"
F	13	"

peninsula, which is separated from the centre of t
estuary, and extends into the harbor. In this
occurred 101 out of the 132 cases in the whole ward.
has a large population of operatives in the Nau
Mills and laborers, many of whom are but poorly pr
comforts, not to say necessities, of life. It is often
family, with many children, occupies a tenement co
or three rooms. That portion of this district whic
the Naumkeag Mills, for the most part, lies so low th
is very imperfect. The land was not properly gra
houses were built and the street accepted by the
when the city, two years ago, laid a sewer through C
the sea-water, at high tide, flowed back through the
cellars. Whereupon the occupants ungratefully br
against the city for damages. A compromise was e
difficulty guarded against, so far as the nature of the
I mention this circumstance to show the importan
which shall forbid the erection, within city limits, o
house whose foundation is not raised a proper dista
water; the proper distance for each locality to be
the city engineer. In the neighborhood of which w
the occupants of many of the houses find it most
throw their slops on to the surface of the yards,
often mingle with them much animal and vegetable
foot of Prince and Pingree streets there is still the
in whose neighborhood I reported nineteen cases of t
the year 1874.

The ward in which the next largest number of case
has occurred is Ward 4, from which 94 cases are rep
an extensive district, and includes all north of Essex St
North Salem) from Washington Street to the bound
and all west of the Turnpike. Between North
streets, or, in other words, in less than one-fifth of t
inhabited portion of the ward, 48, or more than o
cases reported from this ward occurred. In the cen
tion are River and Lynn streets. River Street i
bank of the North River, and is high at its east
western end. Lynn Street meets it at right angle
end. Both streets are quite short. Both are withou
houses on the southern, or upper, side of River Str
into cesspools or sink-holes. From the houses on
the sewer-water runs over the surface of the ground,
bank to the flats. At the lower end of the street, s
Near the upper end, a sewer which takes the sewage

Street and Beckford Street, empties into the sluggish channel th River, the condition of whose banks is fully described in ort of the State Board of Health for the year 1874–75. On wo short streets 17 cases occurred.

d 2 presents the next largest number of cases; namely, 67. se, 48, or more than two-thirds, occurred upon Bridge Street e short streets which lead from it on either side to the flats of River and Collins Cove. Upon Hubon Street,—which is hort, occupies low, damp ground, and whose few houses have nly surroundings,—14 cases occurred. The upper end of Street borders a basin, whose dangerous condition was de- in the report of the State Board of Health for 1874; upon rtion of the street, 15 cases occurred.

he 66 cases which are reported from Ward 3, 3 were upon Street, 10 upon High Street, 3 upon Pratt Street. Since treets are quite short, these 16 cases occurred in pretty close orhood to each other. The condition of many of the tene- and their surroundings on these streets will not bear sanitary ion; especially on High and Pratt streets, where 13 cases d, defilement of the surface-soil with slops and garbage is n, and the shallow privies are widely odorous.

smallest number of cases is reported from Ward 6. This ncludes all of North Salem; its land lies higher, and slopes the south-east; the houses are less crowded together. Of es reported, 10 occurred upon Upham and Walter streets, 12 Iason Street and the short streets, Friend and Beach, which m its upper end to the banks of the North River, and 4 upon Street. The other seven of the 33 cases were widely scat- ver the ward.

534 cases which we have thus examined do not include all ve occurred during the past year. Reports have been re- from nine physicians which aggregate 572 cases; many cases ave fallen into the hands of other practitioners from whom we eceived no statement. The whole number of deaths from eria for the year 1876 was 102. If it be right to approxi- estimate the whole number of cases by comparing the figures e with the reputed practice of the physicians in Salem from o report has been received, the number would considerably 900.

epidemic has been so wide-spread, and the failure to trace ases to any *contagion* have been so numerous in the experi- our physicians, that we are led to conclude that, like the er which afflicted horses in the year 1873, it spreads through

some unknown miasm. Not only the uncleanly se
have been visited, but families whose surroundings
tionable have suffered by this disease. Therefore
source of diphtheria in filth and insufficient sewers
not help thinking that it has found its *best nidus*
among people whose hygienic conditions were unf
ficient nourishment, insufficient clothing, ill-ventil
tobacco-smoke in small rooms, extremes of temp
which must be used at one and the same time for
dining, and sitting room, wet feet, reeking odors
dirty stairways and cellars of old houses, expos
cold and uncleanly privies, are all calculated to p
of the throat and respiratory organs, and to dimin
of resistance to any morbid poison.

Of the contagiousness of diphtheria, when one
ated with the disease, we have abundant eviden
many apparently sporadic cases, it is hard to find
who has not himself been affected by the diseas
another.

Having alluded to the keeping of swine within
will add that this custom, forbidden by our city
have been winked at by our city officials. A muc
have been kept during the past year, not altoget
more strenuous enforcement of the law, but becau
it does not pay to make pork. The reduction
swine has not proved an unlimited good, since n
certain neighborhoods (as in the lower part of
troublesome to dispose of their swill, so that much
scattered about the yards. Our present mayor,
Oliver, has called the attention of the city govern
diency of providing for the removal of swill, ash
from the houses, at the expense of the city. This
as to improve our sanitary condition at small ex
value of the pork that could be thus raised, and
real estate, created by the filling in of stagnant
and the refuse of gardens, would go far toward red
of collecting the material.

The incompleteness of our system of sewerage i
that, according to the present law, sewers can b
owners of estates can unite in requesting them.
happens that the indifference, or penuriousness, or p
embarrassment, of a few, may deprive a large sec
needed relief; but sometimes the natural and

cannot be pursued, and an outlet must be sought by a cir-
s and expensive course. It is very evident that, with the
uction of Wenham water, so much larger a body of water
tributed over our city by the free use of our water-works,
he old methods of getting rid of sewage are quite insufficient;
s the city has provided for drenching the city with water, it
l also provide, by the most equable plan, for an outlet for the
.

unusual interest in sanitary matters exists among the present
ers of our city government. The insufferable stenches, from
we suffered last summer, aroused people and officials alike.
mass meetings were held, at which the evils from which we
nnoyed were enumerated, and resolutions adopted, requesting
ard of health to deal vigorously and effectually with existing
ces. The board responded by remedying, at once, the most
icuous evil, by filling up a portion of the mill-pond and cover-
e flats around the margin of the remainder with gravel. They
ave their attention to devising a method to keep the North
and its banks free from filth. In these and related matters
te mayor, Henry Williams, was active and much interested.
ccessor, as you know, is an enthusiast in sanitary matters,
as a board of aldermen and common council from whom he is
to have hearty coöperation. We have hopes, this year, of
ppointment of a board of health which shall be independent of
ity government, and expect a practical and efficient dealing
he sanitary perils which we have so often recounted.
r correspondent gratefully acknowledges his indebtedness to
physicians who have furnished him with reports of their cases,
o Mr. Charles H. Hayward for his skilful drawing of the
panying map (page 447).

DIPHTHERIA IN LOWELL IN 1876.

e year just closed has been a memorable one for Lowell, because
he city has been visited by the most fatal epidemic ever known
history, if we add to the 158 reported deaths from diphtheria,
aths from croup, and 10 from diphtheria known to be incor-
returned under other names, and thus reach an aggregate of
The epidemic of typhoid fever in 1846, and of small-pox
71, alone can claim a comparison with these figures.

DEATHS.	1846.	18
Population of Lowell,	29,127	41,
Deaths from typhoid fever,	101	
from small-pox,	–	
from diphtheria and croup,	–	
per 1,000 of population,	3.38	4
Percentage of all deaths,	14.64	17

During the first half of the year, the death-rate w
lower than it had been for eight years, within the same
the month of July, with its high temperature and unus
rolled up the unprecedented number of 160 deaths,
were from cholera infantum and 8 from diphtheria.

August, usually the wettest of months, was, this year
and this circumstance had its effect on the remaining
during which the water-supply from the river to the
traordinarily limited. Many of the wells, also, were qu
time to time. Whether on account of these facts, or
them, the mortality from cholera infantum, which, dur
vious two years, was at its maximum in August, w
greatest in July; and the epidemic of diphtheria,
awakened in July, was now under full headway.

Had it not been for this epidemic of diphtheria, the a
rate would have been considerably below the average.
only 20 deaths from typhoid fever and 5 from scarlet
accompanying chart illustrates some of the facts already

Diphtheria.

In the early part of the year diphtheria was quite stri
to the localities in which it had existed during the
In January the mortality reached the highest point whi
attained. From March to July the disease appeared
entirely suspended, but took a fresh start in the l
especially on River Street, where it raged for two mo
this time the epidemic began to be more general, and,
of August, cases sprang up in the most widely separ
the city. The chart, before mentioned, shows some of
of diphtheria. The proportion of deaths to recoveri
stated by several physicians to be 1 to 5 or 6.

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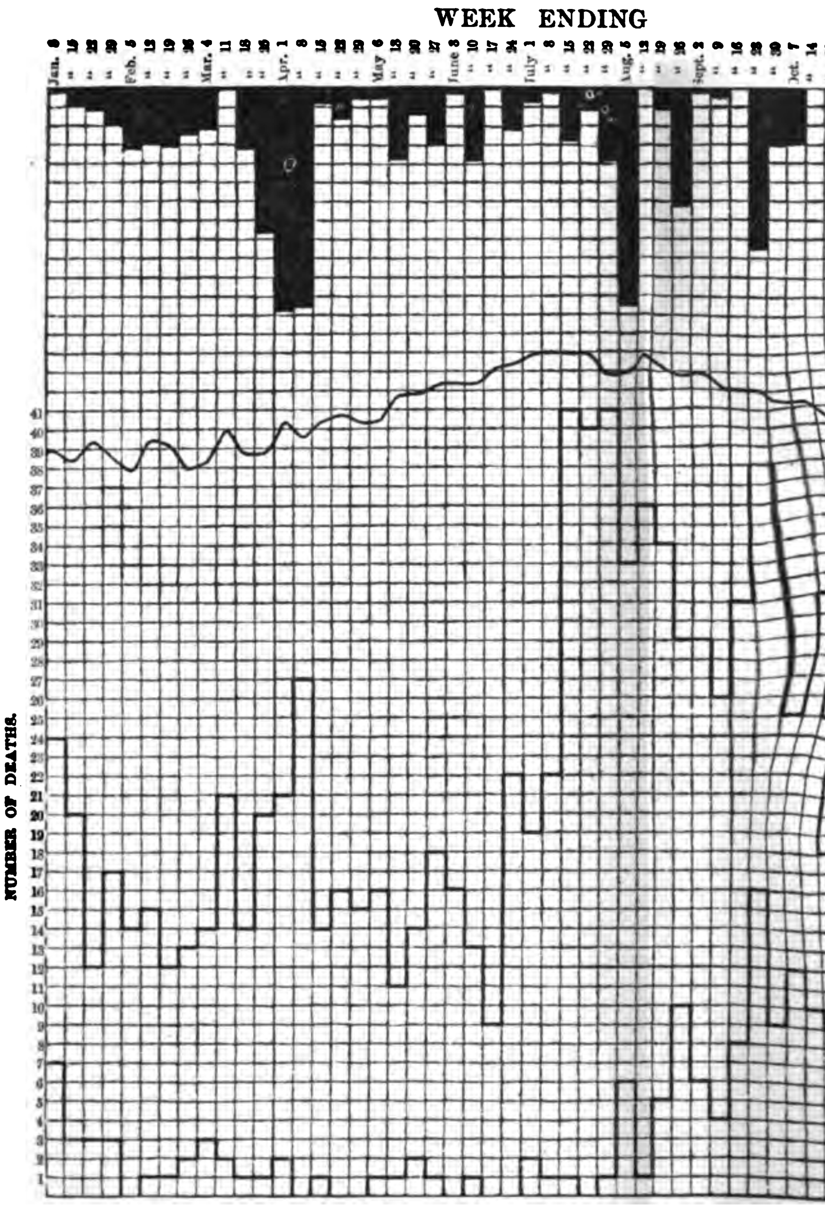
* During this year the mortality from cholera infantum was exc
comparison with other years.



MORTALITY IN LOWELL FROM DIPHTHE

ture of the Disease.—The general character of diphtheria, as it ppeared in Lowell during the past year, is that of a blood n which manifests itself by constitutional symptoms in excess e local signs. The latter appear early, in the form of white raneous patches, situated on either or both tonsils and the back of the mouth, which are, at the same time, sore. The breath ally fetid. The attack is sudden, the course rapid. Death place either by difficulty of breathing, due to the extension of embrane to the larynx, or by exhaustion; and recovery is slow count of the great debility incurred. The after-effects con- ainly of paralysis of various parts of the body. The most on form of paralysis, observed in this epidemic, has been that e palate. One man, after a severe attack, lost the whiskers on ide of his face.

e, Sex and Race.—Children under 10 years of age are the most ptible to infection. In families infected with the disease, s are very rarely the first to be attacked. The following table the mortuary record with respect to ages:—

Under 1 year,	25	deaths.
1 to 2 years,	45	"
2 to 5 "	93	"
5 to 10 "	47	"
0 to 15 "	5	"
5 to 20 "	5	"
0 to 30 "	1	death.

t of 303 cases of diphtheria, 144 were males and 159 females. 318 persons affected, 174 were of Irish, 114 of American, 14 glish, 13 of French, 2 of Scotch, and 1 of Swedish parentage.

cality.—A map representing the elevations of different parts of ity, which are referred to mean low-water mark at Central- Bridge, or 32 feet below the top of Pawtucket dam, as a ard, shows that the vast majority of deaths have occurred within ge of from 10 to 45 feet above mean low-water mark. There about 38 deaths within a range of 50 to 74 feet; there were leaths at heights of 98 and 110 respectively, the first in an perly-drained region on the slope of a springy hill; the second dry place, with the supposition that the patient contracted the se in a lower situation just above a swamp. In a certain region et above low-water mark, on the slope of a ledgy, imperfectly- ed hill, and amidst suspicion of contagion, occurred 2 deaths in amily; and on another, at a height of 80, was a group of cases house whose drainage was exceedingly bad.

e high ground of Centralville, to the east of Bridge Street,

which consists of puddling gravel interspersed w
larger part of the fourth ward, including the "Lo
and some of the recently annexed territory, the
partly sandy and partly rocky, and Ayer city, l
sandy, were almost wholly untouched by the dip
Two deaths in the latter district took place in a lo

The only corporations which suffered greatly we
Tremont, Suffolk, and Merrimac, in the first
the last three mills, there were only 5 deaths, alt
several mild cases. The imperfectly drained, dan
sixth ward, sloping down to the Concord; the va
cord, and of the Meadow Brook rivers in the thi
lies the quarter known as the "Flats,"—these all
quota of victims; but the weight of the epidemic
lying district, which, bordering on the river an
canals, comprises, on the city side of the river, th
part of the fifth. On the Centralville side is the lo
of River Street, which yielded 8 deaths within a
and is a part of the region, the insanitary conditio
pointed out in the last annual report. There we
district just described, 117 deaths.

Foci of Disease.—The Merrimac Corporation has
ly scourged by the epidemic than any other part of
consider the small space infected. There were,
there were four deaths and eleven cases in a bl
Prince Street, in a very low and damp situation.
rear of this block, as well as those in the rear of
burn Street, are not connected with the sewer.
vicinity, was originally a swamp, and has since b
6 feet. It consists of rich mould, resting upon san
of this region is situated a well, the water from w
ten of the families infected. Mr. Pierson, chemist
Print Works, made an examination of this water, th
is given (No. 1) in the following table:—

Number.	Date.	LOCALITY.	Ammonia.	Albuminoid Ammonia.	Solid Residue.			Chlorine.	Oxygen required to oxidize organic matter.	Nitrates.
					Inorganic.	Organic and Volatile.	Total at 212° Fahrenheit.			
	1877.									
1	Mar. 19,	Well on Prince St., Merrimack Corporation, Lowell.	1.1820	0.0280	42.85	11.43	54.28	7.60	-	Large amount.
2	20,	Well at house on Third St., Centralville.	0.0008	0.2050	†	†	118.53	23.60	-	Large amount.
3	21,	Well at Pawtucketville, . .	0.0022	0.0035	9.58	9.00	18.58	2.40	0.07	None.
4	24,	Well at Pawtucketville, . .	0.0015	0.0055	14.28	8.58	22.86	1.80	0.11	None.
5	24,	Well at Pawtucketville, . .	0.0010	0.0045	28.98	12.52	41.50	11.60	0.06	None.

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* Well No. 1 is located on Prince Street, Merrimack Corporation, on the outer edge of the sidewalk. The water furnished by it is largely used by the operatives living in the vicinity. The most important fact learned concerning this well is, that quite a large extent of land occupied by and surrounding it was, about forty years ago, low, wet and boggy; there was also a frog-pond near by; this land was raised about that time nearly six feet, and afterwards the well was dug. The well is about twenty feet deep, lined with brick, and at the bottom is placed a round stone with a hole in the centre.

Well No. 2 is located on Third Street, Centralville, near the bottom of the street, in a yard beside what is commonly called the Mansur House. The well is about fourteen feet deep; no immediate source of contamination presents itself; the water, however, is very foul, for, when any of it is evaporated nearly to dryness, it gives off a very offensive and disgusting odor. The most important fact learned concerning this well was, that up to a certain time, it never failed, either summer or winter, to give an abundant supply of water, but, after a sewer had been built by the city on Third Street, the well very often dries up.

† The determination of organic and volatile matter is of little value in the presence of so much chlorine.

The original sewers of this corporation were built
of carrying off the sink-water alone ; some of these dra
and are more or less used. They are of small calibr
of stone loosely thrown together without mortar or
are connected with the main sewers, which are of late
solidly constructed. The main sewers, which wer
purpose of emptying the vaults, have calibres varyin
inches, and an average pitch of $\frac{1}{16}$ of an inch to
sewer begins at Moody Street, with a blind extremit
the sewage from the mills at the opposite end, en
river through large race-ways, except on Colburn
a connection is first made with the city sewer. Th
of this system of sewerage consist in a want of su
carry off the refuse matter, and an absence of tra
and surface connections ; so that, in dry seasons, suc
described, there is a considerable escape of sewer
houses and passage-ways. The lack of communicat
sink-drains and vaults contributes to this deficien
would be interesting to inquire what influence t
race-ways, which are very large in proportion to the
of the sewers, have, in certain directions of the wind,
up of gases.

In a certain block on Dummer Street, always consid
bounded on one side by a suspicious sewer, and o
noisome vaults, there occurred, in September, five c
dysentery, which destroyed three lives within as
About the same time there were two deaths from di
same spot, and since then three deaths from diphth
place in the same neighborhood.

In a notoriously filthy intermural space, reekin
called Maiden Lane, there co-existed, in the sum
malarial fever and a group of children sick with diph
two died.

In a very old and dilapidated house, on Third
corner of Bridge Street, at a low elevation in Centr
in the cellar of which water frequently stands, there
of typhoid fever in the fall of 1875, and afterward
from diphtheria and croup. The sewage and other
into the yard, around a well, which speaks for itsel
analyses. (No. 2, page 455.)

In other quarters of the city we have gathered in
In a house situated in high, open, cleanly country, a
of diphtheria in August. The lad's sleeping-room w

hy odors which proceeded from a leaky water-closet pipe and a dry well.

the bank of the Meadow Brook River, in the lowest part of egion called "the Flats," there is a block of houses where the h from the vaults and drains is very great. Nearly every y in the house had one or more cases of diphtheria. In one e families there was a case of typhoid fever beside two cases htheria, one of which was fatal.

rly in May, a certain lad was taken sick with diphtheria in a e form. The odor from the disease penetrated into the room the milk, which supplied the nourishment of a neighbor's child, n the habit of standing several hours every day before use. hild was eight months old and lived in a healthy locality. In eeks after the lad was taken sick, the babe was attacked with me disease and died.

the month of January, an epidemic of diphtheria broke out g some children who attended a school in Pawtucketville. The hild attacked lived in a mucky hollow, in a filthy family. She aken January 5th, and on the night of the 7th three other en, living in remote, healthy regions, and at opposite points e compass, sickened; afterwards there were 15 cases of hroat from the same school within two weeks. Some cases red in February, independent of the school. The circumstances sickness among the children pointed somewhat to contagion, he evidence in favor of this view was not sufficiently strong. r from three of the wells (Nos. 3, 4, and 5, page 455), in this ty, were examined by Mr. Pierson and found to be pure.

e facts which are here brought together form only a part of the nce which goes to show that in diphtheria, whose ultimate is unknown, its manifestations, although often erratic, are ible to certain laws. Admitting that the cause is external in ndividual, which appears reasonable, it seems to me that contion of the idea that the atmosphere is a carrier of the poison, tained in the fact that we have on record four deaths from heria in infants whose diet consisted exclusively of the mother's Of contagion we have had such striking proofs that our physs generally have testified their belief in it.

e peculiar susceptibility of children to the disease, as well as eat fatality among them, is also well established.

e favorite haunts of the Lowell epidemic have been low levels e midst of more or less insanitary surroundings. If it be ted that many low and filthy localities are exempt from the se, I reply, so also certain microscopic organisms are absent

from many stagnant pools, but the fact still exists th
isms are generally found in stagnant pools. If it b
other hand, that diphtheria occurs in high and healt
insist upon the rule, and point to the fact that many
general habitat is moist and fertile lowlands, are some
dry highlands.

In conclusion, I submit this report as a step tow
eralizations than investigations in a single locality r

REPLIES FROM CORRESPONDENTS.

From 213 cities and towns, reports have b
relating chiefly to the occurrence or not of dipl
the year, and to the circumstances which have be
with its appearance. So far as these replies a
the opinions of physicians agree, in the main, t
of the disease are in part telluric, or meteorol
present unknown, and that it is contagious, i
attended with the greatest mortality and severit
erally insanitary conditions, especially soil-moist
prevail. Like all other diseases, it is prone to a
debilitated from any cause. A certain number o
remain unexplained now, might in the future
which would modify their at present "mysteriou

Diphtheria has apparently left untouched or
affected, in 1876, a large number of towns whe
rife in 1875. Most of the western part of the
comparatively free from it, especially the valley
field, Miller, and Connecticut rivers, which suf
previously; the exceptions being Williamstown
Holyoke, where the disease was for a time qui
fatal; portions of Westhampton, Northfield, G
Amherst, Ware, Warren, Brookfield, and South
where it was less so, and a few other towns
some of the above, where there were local e
severe or very extensive, and sporadic cases.

In the central part of the State, diphtheria
but not very fatal in Worcester, most of the y
burg quite fatal; in Princeton there was a l
of short duration, but severe; Pepperell an
to a less extent Ayer, Lancaster and West B

ua River, suffered somewhat. In Framingham and a half-n of the adjoining towns, the disease was quite prevalent few months in the year; North Easton suffered severely ughout the year. In Fall River and in the towns, ex-ing up the river to Taunton and eastward to Fairhaven, e was considerable prevalence of diphtheria in not a very form; the Cape and islands, excepting Plymouth and local emics in Yarmouth and Harwich, were very free from it. rom Boston along the north shore of Massachusetts Bay, disease has been most severe, extending also up the rles and Mystic rivers to some extent, visiting Waltham severity; Lynn, Salem and Gloucester suffered the most vily; but Beverly, Manchester, Swampscott, Saugus and other towns to a considerable degree. On the Merrimac er, Lowell, with its shallow soil overlying rock, had the test prevalence and fatality; in Lawrence and Methuen e was less of the disease, with not considerable fatality; Haverhill there were comparatively few cases; and in buryport it was somewhat prevalent only in November December.

iphtheria is described by Hippocrates, is known to have n prevalent near the Cambridge marshes at least as early he beginning of the present century, and first received a inct place in death-returns as diphtheria, the name given y Bretonnau after his careful investigation of the epidemic Tours, in 1818; he did not consider it contagious. The demic in France of 1855, which is thought to have reached gland by way of Boulogne, established its contagious racter in the opinion of the English sanitarians. During first half of the present century, it has been returned in glish-speaking countries as croup, scarlet fever, ulcerated putrid sore throat, *angina trachealis*, *cynanche maligna*, etc. the epidemics of the last three years in Massachusetts, greatest severity and fatality have been reached in rural tricts, corresponding in a general way with the experience England. In that country, "generally, it is more fatal ere there are offensive privies than in towns with water-sets; but cases are found in the year in variable numbers every county and almost in every district." That diphthe-is not as highly contagious and infectious as scarlet fever

is rendered certain from the fact that, unlike
does not prevail most in densely-populated pla
opportunities for contagion and infection are be
like typhoid fever in being more common in co
where there are more chances of filth-infection
cesspools, polluted wells, etc., would be a f
classing it among the filth diseases, unless, lik
and intermittent fever, it is intimately connecte
tions from undrained land.

Of course, the causes of disease, or, at least,
under which disease occurs are exceedingly co
simple, so that in most cases it is extremely d
its precise or even approximate value to each
will be noticed in the replies of our correspon
quite guarded in assigning sole causes to certa
While thorough investigation is valuable in settl
tions, and often directs research with scientifi
should be remembered that science, as well as ig
times has its narrowness, and that false concl
easily be reached by pushing minute examinat
point, as by general and what is scientifically
observation. A striking illustration of this s
be found in the case of four different recent repo
the infantile diarrhœa in an English city, al
"causes." It may be fairly questioned whet
attention now given to "filth diseases" and dr
tant as they are, does not often mislead people
ing other and potent sources of ill-health.

The replies of the correspondents given b
diphtheria, unless it is otherwise stated. The f
shows at a glance the main facts with regard
lence, etc., of diphtheria during the past year,
correspondents are able to report from their o
and from conversation with others.

The contamination of water used for dom
reported in Kingston (page 482) is well wort
sidering the great distance of the source.

Dr. Hulbert's report of the epidemic of ty
South Dennis suggests the danger of living in a

OWNS.	Populat'n by Census of 1875.	Prevalence of Diphtheria in 1876.	Conditions under which the disease occurred.
ngton,	3,241	No cases known,	– –
on,	1,708	Few cases in October,	Nothing special.
shnet,	1,059	Epidemic in October,	Soil moisture.
ms,	15,760	Prevalent in North Adams,	Varied.
esbury,	5,987	Few cases in Nov. and Dec.,	Doubtful.
herst,	3,937	Prevalent in northern part in last half of the year,	Nothing special.
over,	5,097	Few cases in spring,	Houses, etc., well.
ngton,	3,906	Few cases,	Good, and bad also.
burnham,	2,141	Local prevalence in summer,	Damp soil and filth.
by,	962	No cases known,	– –
field,	1,190	Very few, if any, cases,	– –
land,	2,211	Few cases throughout the year,	Not especially unfavorable.
ol,	4,134	Very rare,	Good.
eborough,	9,224	Few cases, and very mild,	Not stated.
r,	1,872	Local epidemic in November and December,	Good and bad.
nstable,	4,302	Very few cases,	Polluted air and well-water.
re,	2,460	Few cases,	Exposure to cold.
ket,	1,329	Very few cases in December,	Filth and moisture.
chertown,	2,315	Very few cases,	Damp and filth.
ingham,	1,244	Very few cases,	Good and bad; wet and dry.
in,	987	No cases known,	– –
kley,	781	Few cases, but very fatal,	Doubtful.
hardston,	991	No cases known,	– –
erly,	7,263	Prevalent, and in May rife,	Good and bad surroundings.
ckstone,	4,640	Only two cases known,	Nothing special.
ndford,	964	No cases known,	– –
on,	987	No cases known,	– –
ton,	341,919	Quite prevalent, especially in suburban parts,	Under investigation.
borough,	318	No cases observed,	– –
lston,	895	Very few cases,	Wet and dry.
dford,	2,347	No cases known,	– –
wster,	1,219	No cases known,	– –
ntree,	4,156	Very few cases in March,	Not satisfactory.
gewater,	3,969	Very few cases; none fatal,	Not stated.
nfield,	1,201	Only two cases known,—fatal,	? Polluted well.
ckton,	10,578	Severe epidemic beginning just at the close of the year,	Wet soil.
okfield,	2,660	Not many cases, but severe,	More commonly wet soil.
okline,	7,500	Quite prevalent,	Mostly wet soil.
kland,	1,921	Very few mild cases,	Not stated.
nbridge,	47,838	Moderately prevalent,	Doubtful and various.
isle,	548	Moderately prevalent,	Good and bad, wet and dry soil.
lsea,	20,695	Quite prevalent,	Generally bad drainage.
ster,	1,396	No cases known,	– –
opee,	10,331	Very few cases,	Not bad generally.
mark,	508	No cases known,	– –
ton,	6,781	Few cases,	Nothing noteworthy.
way,	1,452	No cases known,	– –
mouth,	3,434	Prevalent in one locality in autumn,	Not stated.
field,	3,414	Few cases in latter part of year,	Bad, with lack of clothing, etc.
nis,	3,369	No cases known,	– –
glas,	2,202	Few mild cases, sporadic,	Various; good and bad.
er,	650	No well-marked cases known,	– –

TOWNS.	Populat'n by Census of 1875.	Prevalence of Diphtheria in 1876.	Conditions under which the disease occurred.
Dudley,	2,653	No cases observed,	- -
E. Bridgewater,	2,808	Few cases,	Wet cellars and damp soil.
Eastham,	638	Very few cases,	Wet soil.
Easthampton,	3,964	Few cases,	One bad; the rest good.
Easton,	3,898	Severe epidemic,	Nothing noteworthy.
Enfield,	1,065	Few cases,	Generally bad.
Everett,	3,651	Quite prevalent and severe,	Generally moist soil.
Fairhaven,	2,768	Moderately prevalent,	In most cases, bad.
Fall River,	45,340	Prevalent, but mild, through the year, and epidemic in Nov. and Dec.,	Generally bad.
Falmouth,	2,211	No cases observed,	- -
Fitchburg,	12,289	Quite prevalent,	All parts of city invaded.
Florida,	572	Only one case known,	Not stated.
Foxborough,	3,168	Very few cases,	Not stated.
Framingham,	5,167	Local epidemic in autumn, and somewhat during year,	Mostly wet and ill-drained.
Franklin,	2,983	Local epidemic; not severe,	Not stated.
Gardner,	3,750	Very few cases,	Various; good and bad.
Gay Head,	216	No cases observed,	- -
Gloucester,	16,754	Very prevalent and fatal,	The town is old, badly drained, and supplied with well-water.
Granby,	812	Quite prevalent,	Various; good and bad.
G't Barrington,	4,385	No cases known,	- -
Groton,	1,908	Quite extensive,	Mostly wet or filthy.
Groveland,	2,084	No cases observed,	- -
Hadley,	2,125	Prevalent at the very beginning of the year,	Contagion thought to be chief cause.
Halifax,	568	Prevalent,	Mostly soil-moisture.
Hanover,	1,801	Mild local prevalence,	Good and bad.
Hanson,	1,265	Quite prevalent,	Nothing positive.
Harvard,	1,304	No cases known,	- -
Haverhill,	14,628	Not extensively prevalent,	Nothing noteworthy.
Harwich,	3,355	Not extensively prevalent,	High ground; contag'n.
Hingham,	4,654	Two mild epidemics, in spring and in Dec.,	Generally good.
Hinsdale,	1,571	Scarcely any,	Fair.
Holliston,	3,399	Some cases in December,	Varying; good and bad.
Holyoke,	16,260	Prevalent and fatal last half of year,	Doubtful.
Hopkinton,	-	Prevalent and fatal,	Not stated.
Hudson,	3,493	Few cases,	Nothing noteworthy.
Huntington,	1,095	Few cases,	Dampness and filth.
Hyde Park,	6,316	Severe epidemic, Feb., March and April,	Generally good; not often bad.
Kingston,	1,596	Prevalent, but mild, last half of year,	Nothing peculiar.
Lancaster,	1,957	Few sporadic cases at beginning of year,	Not satisfactory as to cleanliness, etc.
Lawrence,	34,907	Mildly prevalent through the year,	Foul air and insufficient nutrition greatest factors.
Lee,	3,900	No cases known,	- -
Leicester,	2,770	Few mild,	Exposure to cold.
Lenox,	1,845	No cases known,	- -
Leominster,	5,201	Few cases,	Soil moisture and ? filth.
Leverett,	831	Few scattered cases,	Oftener bad.
Lexington,	2,505	Mildly prevalent,	Nothing noteworthy.

TOWNS.	Populat'n by Census of 1875.	Prevalence of Diphtheria in 1876.	Conditions under which the disease occurred.
Leyden,	524	No cases known,	- -
Littleton,	950	No cases known,	- -
Ludlow,	1,222	Very few mild cases,	No facts.
Lunenburg,	1,158	Very few cases,	Generally favorable.
Malden,	10,843	Moderately prevalent,	Usually bad; wet, etc.
Manchester,	1,560	Few cases,	Usually favorable.
Mansfield,	2,656	No cases known,	- -
Marblehead,	7,677	Somewhat prevalent through the year,	Oftener in wet soil.
Marlborough,	8,424	Prevalent at close of year,	Variable.
Mattapoisett,	1,361	No cases known,	- -
Medfield,	1,163	Very rare,	Soil moisture.
Medway,	4,242	Few mild cases,	- -
Melrose,	3,990	No cases known,	- -
Methuen,	4,205	Local prevalence,	Nothing noteworthy.
Middleborough,	5,023	Mildly prevalent,	Nothing noteworthy.
Middlefield,	603	Very rare,	Exposure and bad ventilation.
Middleton,	1,092	No cases known,	- -
Milford,	9,818	Severe in first part of the year, more mild later,	Nothing noteworthy.
Millbury,	4,529	Few severe cases in August and September,	Soil moisture and innutrition.
Monson,	3,733	No real cases known,	- -
Montague,	3,380	Few mild cases; one fatal,	Nothing noteworthy.
Monterey,	703	No cases known,	- -
Nantucket,	3,201	One case,	Damp soil.
Natick,	7,419	Isolated cases throughout the year,	Varied; generally not bad.
Needham,	4,548	No cases observed,	- -
New Bedford,	25,876	Few mild cases,	- -
Newburyport,	13,323	Prevalent in Nov. and Dec.,	Nothing noteworthy.
New Marlboro',	2,037	No cases known,	- -
Newton,	16,105	Prevalent during the year,	Nothing noteworthy.
Norfolk,	920	Local epidemic,	Not stated.
Northampton,	11,108	Unusual good health,	- -
North Andover,	2,981	Local prevalence latter part of year,	Unfavorable, as a rule.
Northborough,	1,398	No well-marked cases,	- -
Northfield,	1,641	Local prevalence, not extensive,	Favorable.
North Reading,	979	No cases known,	- -
Orleans,	1,373	No well-marked cases,	- -
Oxford,	2,938	No cases known,	- -
Palmer,	4,572	Very few cases,	Chiefly by contagion.
Paxton,	608	Few mild cases,	- -
Peabody,	8,066	Quite prevalent and fatal,	- -
Pepperell,	1,924	Unusually prevalent,	Worst cases in damp places, etc.
Peru,	443	Scarcely any cases,	- -
Petersham,	1,203	No cases known,	- -
Pittsfield,	12,627	Not extensively,	Something wrong in most cases.
Plymouth,	6,370	Quite prevalent,	- -
Plympton,	755	Prevalent last third of year,	Soil moisture oftenest.
Princeton,	1,063	Severe local epidemic,	Nothing noteworthy, except contagion.
Quincy,	9,155	Prevalent, but not excessively so,	- -
Randolph,	4,061	Few cases at close of year,	Generally among foreigners.
Reading,	3,186	Few cases; one fatal,	Generally nothing noteworthy.
Rockland,	4,203	Local epidemic in last quarter of year,	Dampness of soil.

TOWNS.	Populat'n by Census of 1875.	Prevalence of Diphtheria in 1876.	Condition under which the disease occurred.
Rockport,	4,490	Very rare,	Chiefly by contagion.
Salisbury,	4,078	Very rare,	Exposure to dampness and filth.
Saugus,	2,578	Moderately prevalent,	Nothing noteworthy.
Sandwich,	3,417	Not prevalent,	- -
Sharon,	1,330	Quite rare,	Good, generally.
Shelburne,	1,590	Very rare and mild,	- -
Sherborn,	999	Very rare,	Nothing noteworthy.
Shirley,	1,352	Scarcely any,	- -
Shrewsbury,	1,524	Very rare,	Nothing noteworthy.
Shutesbury,	558	Very few cases,	Nothing noteworthy.
Somerville,	21,868	Somewhat prevalent,	Nothing remarkable.
Southbridge,	5,740	Not at all prevalent,	Nothing marked.
South Hadley,	3,370	Mild epidemic; but severe at South Hadley Falls,	Nothing marked.
Somerset,	1,940	Prevalent, but not very fatal,	Nothing noteworthy.
South Abington,	2,456	Prevalent during the year,	More among foreigners.
South Scituate,	1,878	Not very prevalent,	- -
Spencer,	5,451	Very few cases,	Nothing noteworthy.
Springfield,	31,053	Few cases,	Generally unfavorable.
Sterling,	1,569	No cases known,	- -
Stockbridge,	2,089	No cases known,	- -
Stoneham,	4,984	Very few cases,	Nothing noteworthy.
Stoughton,	4,842	Mildly prevalent,	Nothing noteworthy.
Sturbridge,	2,213	Few mild cases,	Proximity of filth.
Sudbury,	1,177	No cases known,	- -
Sunderland,	860	No cases known,	- -
Sutton,	3,051	No prevalence,	- -
Swampscott,	2,128	Rather prevalent, and quite fatal,	Nothing marked.
Taunton,	20,429	Prevalent, but not excessively so,	- -
Tewksbury,	1,997	Few cases,	- -
Tisbury,	1,525	No cases known,	- -
Topsfield,	1,221	Not extensively, but fatal,	Nothing unusual.
Tyringham,	517	No cases known,	- -
Upton,	2,125	Quite prevalent,	Generally filthy.
Uxbridge	3,029	Prevalent and severe,	Nothing marked.
Wakefield,	5,349	No cases observed,	- -
Wales,	1,020	Very rare,	Imported.
Waltham,	9,945	Prevalent since June,	Nothing marked.
Walpole,	2,290	Not prevalent; cases very rare,	Nothing marked.
Ware,	4,142	Prevalent, especially in summer,	Oftener wet and filthy.
Warren,	3,260	Quite prevalent, but not severe,	Wet soil.
Watertown,	5,099	Some cases in early part of year,	Nothing marked.
Webster,	5,059	Slight local prevalence,	Nothing marked.
Westborough,	5,140	Not prevalent to any extent,	- -
West Boylston,	2,902	Quite prevalent and fatal,	Damp soil.
W. Brookfield,	1,903	Moderately prevalent,	- -
Westfield	8,429	Very little,	Usually good.
Westhampton,	556	Quite prevalent,	Nothing marked.
West Newbury,	2,021	Very rare,	- -
W. Springfield,	3,739	No well-marked cases,	- -
W. Stockbridge,	1,981	No cases observed,	- -
Weymouth,	9,819	Prevalent and fatal since July,	Variable.
Williamsburg,	2,029	Very few cases,	Usnally good.
Williamstown,	3,683	Rife and fatal in December,	Oftener bad.
Wilmington,	879	No cases known,	- -
Winchendon,	3,762	No cases known,	- -
Winchester,	3,099	More prevalent than for twelve years,	Nothing marked.
Windsor,	624	Scarcely any cases,	- -
Winthrop,	668	Very few cases, and light,	- -

TOWNS.	Populat'n by Census of 1875.	Prevalence of Diphtheria in 1876.	Condition under which the disease occurred.
Woburn, . .	9,568	Mild cases throughout the year, ...	- -
Worcester, .	49,265	Prevalent, but not fatal, . .	Usually, cause obscure.
Worthington, .	818	Very rare, ...	- -
Wrentham, .	2,395	Several cases, ...	- -
Yarmouth, .	2,264	Few cases, but severe, . .	Soil-moisture and filth.

Acushnet.—As far as my knowledge goes, no case occurred until August, when three were taken down, two of whom died. But some two months later, the epidemic again appeared in three new families, widely scattered from each other. It comprised eight cases, varying in age from three years up to about thirty-five—five of them in one family of six persons. After these eight cases occurred, it again disappeared. Of the latter five cases there were no deaths or serious sequelæ, except slight paralysis of some of the pharyngeal nerves in two cases. They were, moreover, severe cases, without exception. These latter cases presented the same general characteristics as the former five spoken of. I could not trace the least history of outside contagion in any of these cases—I mean outside of the families where they orginated. The circumstances of the family, or of all of them, rather, are comfortable as to food and clothing. The air surrounding the various houses was, perhaps, a little more damp than the average, and the ground rather low and a little swampy, though not surrounded by hills. Winds from all points of the compass have free sway without interruption from hollows, etc.

Adams.—Diphtheria has prevailed in North Adams during the past year, and for the last four years, but with far less fatality under the same treatment. I think, from observation in a number of surrounding localities, its fatality is greatest on its first appearance, and, whatever may be the cause, it is less operative in proportion to the length of its continuance, and, like many other forms of disease, tends to exhaust itself. The mansion with careful surroundings has been no less exempt than the hovel; the hill and the malarious valley have seemed to share alike in its distribution, and extremes in temperature, or drought and moisture, so far as I have been an observer, have neither increased nor retarded its progress.

Amherst.—With the exception of some cases at North Amherst, I know of but five or six cases. In all of these cases, the hygienic surroundings have been *good.* In North Amherst all of the cases have occurred within the past six months. With regard to hygienic surroundings, there was nothing peculiar. Some cases of greatest severity were in well-regulated, well-to-do families. The cause of the disease, as it has occurred in my practice, could not be traced to any peculiarity of situation or mode of life.

Andover.—Diphtheria proved fatal in two families, in the spring of 1876. In one family, there were four deaths, and in the other, only one. The four deaths occurred in the course of two weeks, and all were of children. The father, who was first taken sick, speedily recovered. The house in which the four deaths took place was situated on a dry, sandy knoll, was not overcrowded, and had every facility for drainage. I think t the location which could have induced the disease. The single death occurred was also on elevated ground, isola its internal arrangement. There could have been no fa surroundings of either of these two houses.

Arlington.—In one case, a family lost two or three c was situated in a low place, a stream of water runnin These streams of water were running in winter and sp they were dried up. In another case, a family lost two c was situated about fifty rods from the last, on the si ground, and with good drainage. These were both on vated, and in the vicinity of hot-beds.

Ashburnham.—Previous to June, 1876, diphtheria ha known here. During the past summer the disease prev tion of this town, four or five families suffering with it— fatal. There have been a few other scattered cases—mil farm-houses in which fatal cases occurred, situated wi rods of each other; the barns containing "piggeries"; h the houses. Sometimes, in the kitchens and living-room strong odor from out-buildings. In others, the location expect to be healthy, naturally. The surrounding fields those near, immediately surrounding the buildings, bei add that most of the cases occurred in old houses, where have been slowly becoming impure by impregnation years.

Ashby.—There has not been a single case of diphtheria the present year. Whether it is owing to the elevation ing pure air, or the hygienic surroundings of our homes, equal to any town or city of my knowledge, I am unabl

Ashland.—Diphtheria can hardly be said to have prev an epidemic, during the year just passed. The cases ha through the year, that we must regard them sporadic, r The disease has prevailed in all the surrounding towns epidemic, especially in Hopkinton, where the mortality this town, I have treated only seven cases since the first adding the four cases treated by other physicians, sho for the year. In neighboring towns, I have, during th fifteen cases. The hygienic surroundings of these hous larly unfavorable. All classes of dwellings and all c were about equally represented. The cases were as foll

1. A boot manufacturer; surroundings at home ver in a healthy place. Died.
2. A farmer's daughter, aged 24. Farm and all it and in order. Died.
3. A young farmer, aged 25. Surroundings very f Recovered.
4. School teacher; female; aged 23. School-room favorable for health. Recovered.
5. A miller, aged 20. Mill damp, but home very neat.

lerk in post-office; female; aged 27. Office dry and comfortable, ome the same. Recovered.

irl, aged 10. Cellar damp, sink-drain foul, pool very near house; neglected. Recovered.

irl, aged 2¼. Family very poor, but cleanly; hygienic surroundings Recovered.

irl, aged 9. Family lived in a crowded tenement-house; bad sink- ; filthy everywhere. Recovered.

Boy, aged 11. Hygienic surroundings very favorable for health. ered.

Female, aged 28; boot stitcher. Diphtheria complicating "slow "; surroundings not bad. Recovered.

two of the above cases were members of the same family, or lived in me house, or even in the same neighborhood, nor were any two sick same time, except the first two on this list (Nos. 1 and 2), who died me week. No persons caught the disease from any of these patients. cases all occurred in Ashland. Just over the Ashland line, in Hop- n, in an Irish family, all their children, five in number, had the dis- the baby, eleven months old, first, then all the rest in quick succes- the oldest, a boy of 11, had it last. All but the baby recovered. The y were not cleanly in every respect.

leborough.—But few cases of true diphtheria have occurred in the last occasional cases resembling it, coming in groups, present no severe toms, and recover promptly. For many successive autumns, prior to st two, typhoid fever has been extremely rife. The amount was less 75, and showed a further diminution in 1876. We are disposed to at- te the decline of typhoid to the introduction of pure water, but wait fuller experience and a larger generalization before it is possible to an absolute decision. The fact that the section of the town where water was the poorest,—now largely supplied by the public works,— s a large proportionate decline in fever cases, is suggestive testimony.

r.—This is a new town, almost wholly built within the last 25 years, I know of no well-authenticated cases of diphtheria within its limits last winter, when there were perhaps ten cases, mostly mild, and no . About the first of November (there being no cases through the sum- it appeared in a family consisting of the parents and seven children, f whom had it, and four died; since then, there may have been a cases, mostly isolated, with a few deaths. Your correspondent was nly one who had it from direct communication with the family men- d—that is, that can be satisfactorily traced. In the house of the family ioned, the sink-drain flowed over the front yard *west*, keeping it wet a of the year; a pig-pen and stable, not properly cared for, were in *close* mity east and south. One or more kerosene oil lamps have been kept ing *all night* for years (six, to my knowledge—yes, and in spite of it), and *turned low*, for sake of economy, resulting in completely saturating the ; and with an ill-ventilated cellar, this house may be said to have , as to its surroundings, *bad*. Of the houses where other cases have rred, there is nothing to mark them, and, as far as I can learn, they are good condition hygienically. Some of them are new, and are occupied me of the best families. Some of them are located in what we call the althy portions of the village, and, with one or two exceptions, are on , sandy and porous soil.

Barnstable.—In examining the sewerage of the house, a
child from cerebro-spinal meningitis, it was found that t
L of the house, in a summer kitchen. The sink was th
waste water from the pump, and was directly over the
slops of every kind were emptied, and were conveyed,
conveyed, by a lead-pipe, to a receptacle some distan
This pipe had burst near the well at some indefinite ti
the slops and refuse from the house had formed a seeth
tion, nearly a foot thick, over the ground beneath the h
not find its way into the well. I attributed the death
condition of affairs, in positive and unmistakable ter
the earth under the house was cleaned and a large q
acid was used; the drain-pipe was mended, and I was
thing was in perfect sanitary condition. When diph
February, I made further inquiries, and found the rec
overflowing, *within* 20 *feet of the well*, the character of th
coarse gravel, permitting free percolation through it.
water in the well absolutely poisonous, and that its fu
culpable. The well was at once disused and a tubula
distance from it, which is now used.

Becket.—These cases were in a very respectable and r
house is situated within 20 feet of a stream of water
wash of two large tanneries. A privy stands upon the b
used by several families, and the debris is carried away c
is high.

Bellingham.—In some of the cases (particularly thos
disease previously) the hygienic surroundings were go
others—in quite young children—the surroundings were
case of one family, the house was situated near swamp;
in South Franklin, spoken of above, while the house
though moist land, and far from swamps or bogs, the fa
what close circumstances, and my impression is that t
the best character, and was far from well cooked and p
little attention was paid to personal cleanliness; neit
from the kitchen (the sink-water) well conducted off. T
from the house, and I should hardly think could have
the case.

Berkley.—I do not know but the hygienic surrounding
have occurred are as favorable to health as where the dis
vailed. Those three fatal cases before named, were on
boy about ten years old was taken, the location of the di
exclusively in the posterior nares; no passage through
obtained by any means; the patient died comatose. A
in twelve hours from the attack; the mother had it
cousin, about the same age, living about one-third of a m
died in the same way. The other members of the f
mildly. Two cousins, adults, came to the funeral of the
Rehoboth, had the disease afterwards in the same way
death. No. 3. A young married lady, living nearly one-thi
patient No. 1, assisted in the funeral affairs, had the disea

ne near dying; none of her family were affected. All of these cases d on a little promontory made by the Taunton and Assonet Rivers— l rocky and gravelly, mostly, except on the banks of the rivers, where e-meadows lie.

ly.—Diphtheria has prevailed to a considerable extent, not properly ic, but of frequent occurrence. It has occurred in all situations and all classes with about equal frequency and severity. The causes of ease are not clear to me, either by reading or observation. It comes least expected, and does not appear when its supposed causes are most t. . . . Diphtheria has been much more prevalent in Beverly the last year than for any other year in my recollection. The great- nber of cases occurred during the months of April and May, though not been entirely absent at any time. The type of the disease during as very severe, and it was in that month that most of the fatal cases ed. Since that time, the disease has been of a milder form, and the r of cases much smaller, although we are separated from Salem there has been a great number of cases during the fall months) only eighth of a mile of water, and with which town we have daily and nt communication. The locations and hygienic surroundings were arious; frequently there were overflowing cesspools and privies in roximity to the houses; perhaps as frequently there seemed to be no in the hygienic surroundings. The most severe, and the fatal cases, as I can learn, occurred in poor families, where no attention could be cleanliness, sufficient nourishment, or to proper drainage. In one ent there were five cases, three in one family and two in another, with leaths. Investigation showed that both families used water from the istern, which water was nauseous to the taste and smell; the cistern out eight feet from a foul cesspool which had not been emptied for l years, and was on a plane about four feet lower than the cesspool. llar floor was wet, especially near one side of the cistern. The cess- nd cistern were cleansed and disinfected, and there were no more of diphtheria in the house. The disease has not been confined to one f the town more than another, and the majority of the cases have ed among children.

n.—The decline in the death-rate of Boston, as shown by the mortality for 1876, indicates an unusually favorable condition of the public . The whole reported number of deaths for the year was 8,252 against n 1875. Assuming the population of Boston, in the middle of the year, e been not far from 346,000,—an estimate somewhat conjectural, but ed to be not wide of the truth,—we have a death-rate of 23.84 to the iving, against 26.18 in 1875, a decline of 2.34 per 1,000. Excluding the tlying, recently annexed towns, the mortality rate rises to 24.78 per which is a little above the annual average death-rate of Boston for the y years previous to the annexation of those towns, although 3.54 less n the preceding year.*

diminished mortality, due in no small degree to the constant sanitary ision of the City Board of Health, may be also attributable to the par- ubsidence of epidemic influences, and the unusual mildness of the

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e writer takes this opportunity to correct what he fears may have been a misapprehen- the part of the Registrar of his words in the opening sentence of his last Report on the of Boston. He intended no reflection upon that officer.

winter, the mean temperature of the first three months of the year having been five degrees higher than in the corresponding period in 1875.

It will appear from the following table that the highest average weekly mortality was in the third quarter of the year, while the fewest deaths occurred in the second and fourth quarters. The high rate of mortality, in the first quarter, was largely due, as will be seen below, to the prevalence of diseases of the respiratory organs, and the still higher, in the third quarter, to diarrhœal diseases.

Deaths and Meteorology for 1876.

	Average number of deaths weekly.	Mean temperature, Fahrenheit.	Average daily range of temperature.	Avg. weekly range.	Relative humidity.	Fall of rain, inches.	Prevailing winds.	Number of deaths to 1,000 living.	Deaths in London, per 1,000.
Year, . .	158.6	-	-	-	-	-	- -	-	-
1st Quarter, .	172.7	30.0°	17.4°	42.5°	74.2	13.48	S. W., . .	26.2	24.7
2d Quarter, .	139.3	55.3°	17.7°	34.9°	68.3	7.81	W. to S. W., .	20.9	20.9
3d Quarter, .	182.6	67.1°	17.3°	30.5°	69.5	10.93	N.W. to S.W.,	27.4	21.5
4th Quarter, .	140.2	37.1°	16.8°	32.5°	71.6	16.35	W., . . .	21.0	21.4

The diseases to which the excess of mortality was largely due arrange themselves into two groups, one comprising three of the zymotic class, viz., scarlatina, diphtheria and cholera infantum; and the other the acute and chronic forms of pulmonary disease,—especially pneumonia and phthisis. It will be noticed that the death-rate in the second and fourth quarters nearly corresponds with that of London, for the same periods, the excess appearing in the first and third quarters,—the periods of pulmonary and diarrhœal diseases.

Of the 8 zymotic diseases to which there is always a greater or less liability, there were 2 from which there was an almost entire exemption. But 3 deaths are recorded from small-pox, and but 2 from measles, during the year.

The deaths from scarlatina were 456 against 530, or 5.52 against 5.91 per cent. of the whole mortality in 1875. The yearly average for the previous ten years was 4.48 per cent. It will be seen by the table below that it proved most fatal, as in the preceding fifteen years, in the four winter months, while in England it is said to be most prevalent and most fatal in the last quarter of the year. The lowest mortality was in August and September.

The mortality from diphtheria was even greater than in 1875, when the deaths rose to the unprecedented number of 418. During the first quarter of the past year, before the epidemic wave had begun to subside, it was more fatal than in the subsequent quarterly periods, the deaths numbering 225. In the third quarter they had declined to 88, again rising in the fourth to 138,—making the whole number for the year 575, or 6.94 per cent. of the entire mortality. The average for the previous ten years was 1.50 per cent.

The deaths from croup were 132 against 214 in 1875. It was most fatal in January and May, and least so in September.

The deaths from whooping-cough were 58 in number, or 0.70 per cent. of the whole mortality, against 0.44 per cent. in 1875, although less than the average mortality from this disease for the previous ten years.

The diarrhœal diseases were the cause of 824 deaths. Of these, 544 were from cholera infantum, which, notwithstanding the unusual heat of the summer, was less fatal than in 1875.

The number of deaths constituted 6.59 per cent. of the whole mortality, against 7.94 per cent. in the yearly average for the previous ten years. The rate per 1,000 living was 2.38, a decided decline from the mean of the previous eleven years, which was 3.02.

The deaths from typhoid fever were 144, 81 less than in 1875, and 1.74 per cent. of the whole mortality. The average percentage for the previous ten years was 2.58.

The deaths from phthisis were 1,279, against 1,357 in 1875. The percentage to the whole mortality being 15.37, and the number to the 1,000 living, 3.69, against 3.86 in that year, showing a still further decline in the mortality from this disease.

Table showing the Deaths per 1,000 from Phthisis in Five Census Years.

1850.	1855.	1865.	1870.	1875.	1876.
4.28	4.57	4.22	3.96	3.86	3.69

Pneumonia, also, was less fatal than in the preceding year. The whole number of deaths from this disease was 518 against 666, and 6.27 per cent. of the whole mortality, against 7.43 in 1875. It proved most fatal in March, and least so in September, as appears in the table below.

The deaths from bronchitis were 226, against 259 in the previous year. The largest mortality for this disease was also in March.

The following table gives the monthly mortality from the above diseases, with the deaths under one and five years of age, and of persons over seventy years of age. It does not include still-births, which were 491 in number.

Table of Monthly Mortality.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentage of mortality.
Total deaths,	809	709	728	681	587	541	872	855	647	613	540	670	8,252	-
Under 1 year,	157	191	205	142	105	129	364	350	216	119	107	128	2,218	26.80
Under 5 years,	280	305	306	269	196	224	499	495	330	230	187	242	3,563	41.80
Small-pox,	-	-	-	1	-	-	-	-	-	-	1	1	3	0.03
Measles,	-	-	-	1	-	1	-	-	-	-	-	-	2	0.02
Scarlatina,	96	63	47	40	23	24	26	17	10	24	33	53	456	5.52
Diphtheria,	92	77	56	43	41	40	30	33	25	44	37	57	575	6.96
Croup,	23	13	12	13	17	6	4	5	3	12	7	17	132	1.59
Whooping-cough,	3	-	4	3	1	2	4	5	11	6	5	14	58	0.70
Diarrhœal diseases,	11	4	7	14	5	15	271	296	146	43	6	7	824	9.98
Typhoid fever,	14	8	6	4	7	14	8	17	21	24	13	8	144	1.74
Marasmus,	25	34	35	27	28	30	32	55	35	27	22	25	375	4.53
Phthisis,	120	115	101	121	101	97	107	108	83	118	88	120	1,279	15.50
Pneumonia,	69	58	76	57	52	24	21	15	24	36	31	55	518	6.27
Bronchitis,	22	25	31	27	10	17	12	10	13	18	22	19	226	2.73
Deaths in institutions,	-	60	122	63	73	77	96	91	51	83	64	79	859	10.40
Over 70,	76	54	72	78	57	46	49	48	42	49	59	65	690	8.36

It will be noticed by this table that the highest mortality was in August, during the prevalence of cholera infantum, and the lowest in November, after the decline of the diarrhœal diseases, and before the advent of winter, when pulmonary affections again became predominant. It will be seen, also, that the deaths of children under 1 were more than 26 per cent., and of children under 5 more than 40 per cent. of the entire mortality. It has been, unfortunately, impossible to ascertain, with any accuracy, the localities* where the above diseases mostly prevailed, but they are believed to be nearly the same as in years past, as the same influences are, in a greater or less degree, still operative in those districts.

In reviewing the general sanitary condition of Boston, there is little to be added to what was contained in the last annual report of this Board. It is believed that some preliminary steps have been taken toward carrying into effect the suggestions of the late commission on sewerage, but have as yet been followed by no very definite result. Notwithstanding the constant and invaluable labors of the City Board of Health in improving the condition of tenement houses in various parts of the city,† and in general sanitary supervision, many of the unhealthful influences still remain as heretofore, and will still continue until some more comprehensive system of sewerage and soil-drainage shall be adopted than now exists.‡

It appears from the last report of the Board of Health there are still "acres upon acres densely crowded with tenement and other dwelling houses, whose cellars and basements are wet throughout the year, and whose yards are seldom dry," a condition directly favoring the development of phthisis, and lessening the power of resistance to all morbific influences. In many parts of the city there are also, it is stated, "areas of unoccupied land, the surface of which is covered with stagnant water most of the year, and are made the receptacles of dead dogs, cats and other filth." "During the summer,"—we quote from the report,—"the water becomes covered with a green slime, and is at times exceedingly offensive." § All efforts for the removal of this evil have thus far proved ineffectual. More than 1,200 lives succumbed in 1875 to causes believed to be preventable. As each life is of a specific value to the State, the question is a pertinent one, whether on the score of economy as well as humanity, any effort should be spared to check so wanton a waste of life. "The hope of saving any number of lives by hygienic appliances," says a distinguished writer, "is enough to fire the ambition of every good man who believes in human progress." ||

A recent writer on this subject has hazarded the opinion, that there is no valid reason why a lower death-rate in Boston should be expected during the next twenty years, whatever may be the measures adopted and carried out for the preservation of the public health. The remarkable results of sanitary effort in London and elsewhere, furnish, perhaps, the best reply to this some-

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* It would add much to the value of the weekly mortality reports of the Registrar and the Board of Health, should they be made to comprise not only the ward or district where the death occurs, with the age and sex of the decedent, but the number of deaths at least from zymotic diseases that have occurred in each ward.

† The number of houses ordered to be vacated during the last year by the Board of Health was 148, although the number vacated was but 67. The reasons for such action were stated to be "filth, stagnant water, defective drainage, defective and offensive vaults, and want of repair," etc.

‡ See an able paper on Infant Mortality in the Report of the City Board of Health, by Dr. W. L. Richardson.

§ Fourth Annual Report of the Board of Health of the City of Boston.

|| Dr. Farr.

what sweeping statement, and show what may be accomplished by a vigorous and skilful sanitary administration. In the latter part of the 17th century, in what may be called the dark days of sanitary science, we are told that the deaths in London reached 80 in 1,000. This number had fallen, in the 18th century, to 50 per 1,000, and has since declined to its present rate, less than 24 per 1,000, and is still declining. The results of sanitation in many of the rural towns and districts of England are not less striking. In a late report of the Registrar-General, a list of districts is given in which the death-rate had been reduced, by sanitary means, during the last 30 years, from 4 to 6 per 1,000. Perhaps the most remarkable instance mentioned, is North Witchford, where the average mortality fell from 27, in the years 1841-50, to 21 in 1851-60; to 20 in 1861-70, declining to 17 per 1,000 in the subsequent four years, 1870-74. These results, mostly due to the introduction of pure water and attention to proper sewerage, give pertinence to the remark of Dr. Farr, "that it is as certain that a high mortality can be reduced, by hygienic appliances, down to a certain limit, as it is that human life can be sacrificed." That this limit has here been reached, will not for a moment be assumed. The mortality in the past year, from all diseases, excepting those of the zymotic class, which are believed to be largely due to removable causes, was at the rate of 17.89 per 1,000. This, then, may be fairly considered the limit, however far removed, which it should be the aim to reach, and until a decided advance toward it has been made, the work of the sanitarian must be regarded as incomplete.

The following table gives the reported population and death-rates of 56 cities in different parts of the United States:—

CITIES.	Population.	Death-rate.	CITIES.	Population.	Death-rate.
New York,	1,046,037	27.87	Reading,	40,109	24.68
Philadelphia,	825,000*	22.93	Minneapolis,	40,000	10.77
Brooklyn,	527,830	23.31	Paterson,	40,000	26.65
Chicago,	420,000	20.41	Dayton,	36,000	14.47
Baltimore,	355,000	20.79	Evansville,	36,000	17.33
Boston,	346,000	23.84	Lawrence,	35,000	24.14
San Francisco,	300,000	18.89	Utica,	35,000	15.97
Cincinnati,	280,000	20.39	Quincy,	35,000	21.18
New Orleans,	215,000	29.10	Lynn,	33,000	21.72
Cleveland,	162,000	19.90	Springfield,	30,000	21.05
Washington,	160,000	26.40	Harrisburg,	28,000	17.14
Buffalo,	150,000	14.29	Wheeling,	28,000	21.82
Louisville,	150,000	18.50	Nashville,	27,000	33.55
Pittsburg,	145,000	19.97	Fort Wayne,	27,000	15.44
Detroit,	120,000	15.31	Salem,	26,700	23 26
Milwaukee,	110,000	18.95	Erie,	26,037	13.44
Providence,	103,000	14.64	New Bedford,	26,000	22.92
Albany,	95,000	13.78	Elizabeth,	26,000	16.38
Richmond,	75,000	21.98	Terre Haute,	25,000	7.68
Syracuse,	60,000	13.60	Norfolk,	23,000	21.83
New Haven,	60,000	20.43	Somerville,	22,000	20.18
Charleston,	56,540	35.58	Bridgeport,	22,000	18.59
Worcester,	52,000	21.61	Chelsea,	20,692	20.29
Hartford,	50,000	19.06	Taunton,	20,500	20.39
Toledo,	50,000	14 80	Augusta,	20,000	19.80
Cambridge,	50,000	19.32	Wilmington,	20,000	13.50
Lowell,	50,000	22.91	Norwich,	19,000	23.42
Fall River,	46,000	24.13	Yonkers,	17,500	21.77

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* This estimate does not include the strangers in the city during the Centennial Exhibition.

Braintree.—Most of these cases occurred in families in comfortable circumstances. The families were not particular in regard to their sinks and drains; slops and filth too near their dwellings. As most or all of the cases, whether fatal or otherwise, occurred about the same time, and in various parts of the town, it seemed to be the result of atmospheric conditions.

Brimfield.—There have been but two cases of diphtheria in this town during the last twelve months. These were both children, and both belonged to the same family; both died. The house is an old one, and is situated on a side-hill, with quite a steep grade. Almost at the foot of the hill is situated the well from which all their water for household use is obtained. About one rod above this well, their sink-spout empties all the refuse water and slops directly on the surface of the ground, and, as water will run down hill, it of course runs and stands all around the well.

Brockton.—I think the bulk of the cases of diphtheria reported in our vicinity have been confined to that portion of our town where the soil is springy and new; what might be termed our low lands. The drainage of the houses in this vicinity is everywhere poor, and the sink-water runs on the surface of the ground until it is lost by self-exhaustion. The well-water is poor, as is the case generally in our town, with a few rare exceptions.

Brookline.—The hygienic surroundings of the houses on the marsh, where most of the deaths occurred, are *extremely* poor. They are crowded and filthy. In that locality a sewer which drains two of the principal streets—Washington and Walnut—empties into a very slow-running brook, which is, to all intents and purposes, an open sewer. In summer, the stench is at times intolerable. Eight of the deaths occurred upon a street which runs parallel and very near to this brook.

Buckland.—There has not been a severe case of diphtheria in town the past year; there have been some half-dozen very mild cases. I have been in practice here more than twenty-five years; during this time there has not been a single year when there was not twice the amount of acute disease there has been the past year. All of our fevers have been of the mildest type.

Conway.—We have had no diphtheria in our town during the past year. The epidemic which prevailed here very fatally during the winter of 1874 and 1875 spent itself mostly in the following spring, though an occasional case occurred during the summer and autumn following; but since then nothing of it has appeared.

Dennis.—There are but few places better drained, or in past years that have been more healthy, than South Yarmouth; yet diphtheria has prevailed there for ten or twelve months, to the sorrow of not a few families. The exact number of deaths, or the number of cases, I am unable to state, but what is so curious and wonderful is, that in West Dennis there should not be a case, although separated by only some ten rods of water.

East Bridgewater.—The hygienic surroundings in the cases mentioned were apparently the same as in many other dwellings. A great many of our people have wet cellars. Quite a large portion of the town has a clay subsoil, and, being level, the drainage is imperfect.

Eastham.—Where the cases referred to took place, was in the lowest lands of Orleans, near salt-marsh on one side and a filled-in swamp on the other side.

Easthampton.—I know of only five cases of diphtheria during the year, though popular report makes many more, it being the habit of some practitioners to call every case of sore throat, even the slightest, by that name. These five cases were severe, but none fatal; one was diphtheritic scarlatina. The hygienic surroundings in every case but one were good and salutary; that one was squalid and filthy, though the house was on a mountain-side, and near no other one. It was impracticable to cleanse or civilize the family, yet the case convalesced as well as others with better surroundings, except being followed by a large abscess in neck.

Easton.—This village (North Easton) has been one of the unfortunate victims of the above *fatal* disease. The first case occurred in January, 1876, and we have not been free from it from that day up to date. The last death from it occurred only last week. During the year 1876 there were 45 deaths in this town from diphtheria, and all but two or three were in this village. All the fatal cases were among our foreign population, or nearly so (deaths occurring only in three American families, I think). In some case all the children in a family would be swept away; in one family, 5; in others, 3; in others, 2; and in others, 1. The fatality did not abate until about July, since which time the majority of the cases, although apparently seeming as violent at the onset, have yielded to treatment. Although very few of our American families have escaped having one or more cases in their midst, they have in nearly every case recovered, which I can only attribute to better ventilation, better nursing, more care in and opportunities for keeping the rest of the family away from the sick, and especially to their sending more promptly for their physician. I have been unable to trace the epidemic to any satisfactory cause. I am satisfied that it is not a "filth disease," for it would strike alike upon the cleanest and filthiest houses; neither did poor drainage seem to attract it any more than the reverse; we all shared alike. Although I know that many, if not all, my medical brothers will disagree with me, I must say that I have seen nothing to convince me that it can be carried in the clothing from one to another. Neither do I believe that by simply going into the house or room where a diphtheritic patient is, that there is much, if any, danger of contracting the disease. I have never seen a case where I thought the disease was contracted in that way, and I have watched this matter closely. Notwithstanding my belief, I have always tried to be on the safe side, and use every means in my power to prevent its spreading; have always taken the other members of the family out of school; have advised every one to keep their children away from houses where the disease was, and to keep away themselves, unless needed as watchers or nurses; have advised them to keep away from the "wakes" and funerals. My opinion is, that when it occurs in a family, all or nearly all the family have it, either in a mild or severe form, for the reason that they have all been subjected to the same surroundings and the same influences. I have found that sending all the other children away from home, as soon as the first case made its appearance, did not, in many cases, save the others from having it, before they returned home, even.

Enfield.—All the cases except two were scantily clothe
ished, and crowded together in sleeping-rooms dark and ill

Everett.—There have been 27 deaths from diphtheria,
clerk's record, in this town, since January 1. There hav
cases in all. In the case of S——'s family, the three chi
noticed that the cellar bottom was *lower* than the privy-va
tion of the owner of the house; cesspools also too near the
fatal cases, however, occurred in localities high and appare
—among the wealthy class, as among the poor; more fat
and September than before.

Fairhaven.—In a great majority of cases that have come
vation for years, the sink-hole or privy has been so near t
ing-water, that I have been forced to the conclusion t
primary source of the disease.

Fall River.—There have been with us throughout the yea
cases of diphtheria—which two months ago assumed a pro
it to be called a mild epidemic. This has now subsided
hygienic surroundings of houses where cases have occurre
I don't recall any case in my own practice where they hav
ought to be, though there were those in which no neglect

Fitchburg.—Diphtheria has been quite prevalent in this
year (1876), bringing up our death-rate per 1,000 from b
to 20. We have a population, according to the last
During the eleven months ending December 1, there hav
from diphtheria, 21 per cent. of the whole number of deat
tality than from any other disease. Usually our greatest
consumption, averaging about 17 per cent. of all deaths.

In 1875 there were 14 deaths from diphtheria.

In 1874 there were 3 deaths from diphtheria.

In 1873 there were 3 deaths from diphtheria.

The present epidemic began in March, 1875. At this ti
who had been at work in Greenfield, Mass., was returning
home in Bolton, Mass. On the arrival of the train in Fitc
so sick that he was left at the station and taken to the alm
rapidly worse and died soon after his arrival there. This
theria in an unusually severe and rapidly fatal case. A
daughter of the keeper of the almshouse was taken sick
and died in a few days. She lived in the same house wher
died, but had not been in the room with him. The young
taken to his home in Bolton, and soon after the funeral, t
were taken sick with, and one died of, diphtheria. I spea
the apparently contagious character of the disease in the

This, the first death, occurred March, 1875, in South Fit
the city about one mile distant from the railroad station,
rated from the main part of the city. The only cases of dip
are not many, which occurred for the next seven months
district, mostly a low district near the Nashua River, thou
where the boy died is situated near by in a healthy l
valley of the river. During this seven months there were

oning the two at the almshouse already mentioned. One occurred in
e, one in July, one in September, and one in October, all of the four in
ich families. In October, two weeks before the last death above men-
ed, the disease appeared in the city proper. The first six cases all
nded one of the grammar schools, but no local cause was discovered
e, and it soon appeared in all quarters of the city, the first death occur-
in October, making two deaths in October in the whole city. In
ember there were 3 deaths; in December, 5; in January, 1876, 4; in
ruary, none; in March, 13 (the height of the epidemic one year after its
appearance). In April, there were 4 deaths; in May, 5; in June 8;
uly, 4; in August, 3; in September, 4; in October, 3; in Novem-
5.

the 14 deaths in 1875, there were:—

'rench parentage,	7	Under 5 years of age,	8
merican parentage,	5	Between 5 and 10,	3
rish parentage,	2	Between 10 and 15,	2
er 2 years of age,	2	Between 15 and 20,	1

the 54 deaths in 1876, up to December 1, there were,—

merican parentage,	25	Between 5 and 10,	19
rish parentage,	22	Between 10 and 15,	3
'rench parentage,	4	Between 15 and 20,	2
English parentage,	3	Youngest, 22 days.	
er 2 years of age,	11	Oldest, 16 years.	
er 5 years of age,	28		

e disease has prevailed in all quarters of the city, where city water is
and where it is not, where there are sewers and where there are none,
re it is high and where it is low, where it is dry and where it is damp,
lly or nearly so among native and foreign population, most extensively
hildren under ten years of age, and in the month of March. It has
ed to me to be more widely prevalent in localities where the drainage
ost imperfect and dampness most common. City water is pretty gener-
introduced into the city, but we have very few sewers. This makes
ncrease in the surface-moisture inevitable, and I think may explain why
theria has remained here so long and prevailed so extensively. I do not
that the virus of diphtheria was introduced in a concentrated form by
case brought from Greenfield, finding here a place favorable for its
lopment, but I think the facts are very suggestive, and you can draw
own inferences. I may say, as having some bearing on this subject,
typhoid fever has not been quite so prevalent as usual—comparatively
e of it. . . .

. . Diphtheria has been almost constantly prevalent during the past
, and hardly a month has passed without its fatal cases. In two years it
een one of the prevalent diseases much of the time, and I may safely say
more cases of the disease have occurred in this period than in the fifteen
s preceding. It has become a common disease, and the mortality has
med comparatively large proportions. During the past season, other
otic diseases have been remarkably infrequent, and almost invariably of
type. All parts of this city and vicinity have been visited by the
ase, and no social condition has escaped; but, so far as I am able to form
pinion, hygienic conditions exercise considerable influence. It seems to

me that I have had more cases in damp, shady localities
that were dry and where there was plenty of light and air.
have attended have occurred in poor tenements located in
drainage, and where the diet of the inmates was coarse an
In several of these severe attacks, the water used by the
from wells. It has been quite noticeable that, although a
have been more or less affected by the prevalence of the
occurred in groups, one locality or neighborhood usually

Foxborough.—There has been no epidemic of diphtheria a
the disease during the current year. I recall only two cas
The first (an infant) was thought to have contracted t
visit in another town. No particulars can be obtained a
The case was not in the care of any regular physician, an
disease was not recognized until after the death of the
this occurred, a lady, who had been much engaged in th
was attacked with genuine diphtheria, and recovered aft
the ordinary stages of a severe attack. She had partia
persisted for a considerable time.

Framingham.—The locality where most of these cases oc
badly drained. House-drainage, cesspools, wells, etc., a
part of the town.

Granby.—A. Three cases in one family; two death
filth as a cause for the disease; no other cause found.
this family; four deaths. Family, Irish, and have al
C. Three cases in another family; three deaths. Mot
sick with the disease in another town, and her own child
soon after her return to it. The family "B" also had the
after a visit to the house of "C" by the mother. D. Th
dence of filth as a cause; all recovered. E. Three ca
lived near a pond from which the water had lately been
cause discovered. F. Two cases; no cause detected; al
ily "B" and family "D" lived on low ground, but in dr
families on high, dry ground. These families lived mo
each other.

Halifax.—I have had about 50 cases in my practice
year; only 18 of these cases occurred in this town. Last
a single case. Most of these cases were in dwellings lo
places, many of them having water standing in the cell
of 11, every member, with the exception of the mother
disease in a very malignant form.

Hanover.—Since the epidemic of 1866-7, which was
fatal in this section, I have seen no case that could prop
theria until March, 1875; and this epidemic had its ori
source as that which proved so severe in South Hanson.
died, two of which were just convalescing from scarlat
one from the intensity of the poison owing to filthy sur
fourth very suddenly, probably from paralysis of the
days after treatment was stopped. I have considered the

lly in every case, and, with the exception of the fatal case mentioned ove, cannot connect the disease with very objectionable hygienic causes; d this case, though the house was damp, yards very filthy, and water bad, nnot positively be said to owe its malignancy to these causes, as there ere five other cases in the same house, which recovered without developing usual malignancy, though attended with severe local and constitutional enomena. With the exception of diphtheria and some malignant cases of arlatina, which occurred last winter and spring, there has been no severe kness during the year.

Hanson.—Last year it was confined to the southern part of the town along e low lands, and there were very many fatal cases. This year almost all ve been in the northern part of the town; the only fatal cases were in uth Hanson. There had not been a case in South Hanson for two months hen a boy (about 10) was taken sick and died in less than a week. There ve been no cases there now for three months.

Haverhill.—Diphtheria has not prevailed to any extent since the last port. We have been wonderfully exempt from the disease as an epidemic. e cases that have occurred have been sporadic, and quite mild in charter. Some of the neighboring towns of New Hampshire have been verely afflicted with the disease, and several families visiting those locales from this city have been afflicted with the malady. I can discover thing in the "surroundings" that would have a tendency to induce the sease. Three cases occurred in a house free from dampness, situated in an evated region, the family occupying the *upper* tenement. Other cases have curred under a great variety of local peculiarities, but I do not know of a ngle case in the more filthy and neglected portion of the city. Our worst ses have been confined to elevated regions, with sunny exposure and ndy soil. Our water-supply is pure and abundant, and our drainage tter than the average of rural cities. . . .

During 1876 we had very little of diphtheria in Haverhill, the few cases ing mostly in January and December. I have not found any unhealthy ndition or circumstances to be common to any great number of houses in hich I have seen diphtheria. I am confident that the average sanitary ndition of the habitations of my diphtheritic patients is not lower, but ther higher, than the average of all my other cases of illness. As an illusation of this statement, I will state that I saw at least 50 cases of all ades (mostly light) in this epidemic before one of them was in an Irish mily, and that in all there have been but very few cases amongst the Irish, though every known sanitary law is hourly violated in the quarter inhabed exclusively by that nationality. Epidemic influence and the facilities r contagion are the only causes for the disease I have been able to trace t satisfactory to myself.

Harwich.—There have been but 12 or 14 cases of diphtheria in town this ear; all of which occurred within the months of December, 1876, and Janry, 1877. The houses where each case occurred were on high ground and one neighborhood. My opinion is that the latter cases were wholly from ntagion, and, in fact, by a careful examination of the surroundings, I find cause for the first cases. All the cases were children except two, and ere of scrofulous diathesis, and inclined to sore-throat—tonsilitis or croup. he origin of the cases is not explained to us satisfactorily, the hygienic rroundings being *good*.

Holliston.—The disease first appeared in a family wher
ditions were *favorable* for the generation of any filth disea
cases occurred in families where the hygienic conditions
roundings were good, and the inmates had not been exp
as far as known to myself or patients. The disease *seem*
than epidemic.

Hingham.—Diphtheria has not prevailed here, except
within a year. The first case appeared April 28th, in a
Her brother, aged 14, was taken sick five days later. Fir
the fifteenth day, from asthenia; the boy recovered. Two
of first patient, an older brother, aged 18, was taken sick,
four days later. The former died on the ninth day, an
ered after long convalescence, with paralysis. One child
A little girl, playmate of the first patient, was taken do
her, and the disease spread through the family. Out of
died. At about the same time, the disease appeared at
parts of the town. No new cases appeared after June, un
ing the last month there have been a few isolated cases.
about 30 cases and 11 deaths, not counting those of recen
enic surroundings of the house in which the first case ap
ingly good. The house stands high and dry, in a retired
The family are exceptionally neat. Apparently, the hy
infected houses and their surroundings were generally
well of the family in which the disease was most fatal
analysis to contain the purest water of ten wells taken fr
of the town. The disease afflicted rich and poor alike.

Holyoke.—Diphtheria has prevailed here during the pas
greater extent than ever before, probably. Neither has it
so fatal. In several instances, nearly the entire families
out. In one instance, three children and the mother we
family of six, all in less than a week; in another, two child
eight hours. It has invaded all parts of the city, but has
what, from its topography, was considered a healthy loc
tunately, in that section, the sewers are not yet complet
enic surroundings" not what they will be another year
vailed to as great an extent in the best-drained portions o
not so fatal in degree. It has become a question in my
the bath-room and water-closet in such close proximi
apartments in our modern houses are not a most fruit
loathsome, disgusting disease.

Hudson.—There have not been many cases of diphtheri
the past year. In my own practice I have had only eight
only very few others. There have been no fatal cases,
have been of a mild type. It has never prevailed here to
although we have a large number of cases of throat di
have occurred in all parts of the village and the surround
were able to learn, were not different from the majority o
Nearly all of my own were families in comfortable circumst

Huntington.—There have been but few cases—not to exc
bad, damp cellars and accumulation of filth near the hous

, that the dampness has been more productive of diphtheria than the . I have not known a case where due attention had been given to nage, cleanliness and ventilation.

yde Park.—A severer epidemic occurred during February, March and il than has ever before visited our locality. The care of twenty cases to my own share. Of these twenty, seven terminated fatally. Five cases rred in one family, where three died. In another family, some mile and lf distant from the first, three cases occurred, two terminating fatally. his family, the patient that survived has only just now recovered her ner standard of health. In a former paper I have stated that paralysis not happened to be among the sequelæ that I had seen, but, in this , complete paraplegia occurred, also paralysis of muscles of speech, with ness of vision; and all this came on after convalescence from the diph- itic affection had become apparently well established—so far, that the ent had walked out in the grounds about the house. In still another ily death ensued suddenly after diphtheritic symptoms had apparently rly subsided, death resulting from prostration. The other cases of recov- seem now to suffer no ill-effects. In two or three instances I have not n sure that the drainage has been perfect, and the water-closets were ed after as well as seemed possible, but there was a chance for suspicion hem in perhaps two instances. Nine cases occurred, resulting in four ths, in three houses out of five standing side by side on the same side of same street, in a region as perfectly drained as it is possible for it to be; it must be admitted that every attention was paid to cleanliness, in at t some of these families, that can be paid to it anywhere. One isolated occurred where the residence was on high ground sloping from it in all ctions, and as free from dampness as it is possible for ground to be,— re the family was small and the privy cared for as well as it could be, one would say that the hygienic conditions were as favorable as any- re in any community, and yet a fatal result was expected for days, and finally barely escaped. I cannot draw any inferences concerning the uence of hygienic conditions from a review of my cases. Their severity certainly not been in direct ratio to the filth and dirt by which they e been surrounded. Very few of the foreign population, so far as I w, have been affected. Of my twenty cases, none were of that class. y they have been so nearly exempt, I do not know. Why others have not n afflicted, I cannot tell. I have tried to give results as they actually k place.

Kingston.—Diphtheria has never prevailed in this town to any great ent, but there has been more during the past year than all previous years, mostly the last six months. I have kept no record of cases, but should ge there had been forty or fifty cases the last six months, mostly of a very d form. I beg to report to you an interesting fact or circumstance which e under my observation a few months ago; viz., Beside a small, never- ing brook is a spring, with a tub or barrel set in the edge of the brook, re two families get their water for drinking and cooking purposes. ring the dry weather last summer, a man drove an artesian well, 150 feet n the spring, and on land ten feet higher, using common iron pipe, not vanized. The well was put down about twenty feet, and the pump was rked by a windmill for irrigating purposes. In a few days after the nping commenced, the families noticed that the water in the spring was not as good as usual. It did not taste good, and tea ma and not fit to drink.

Lancaster.—No cases of diphtheria since the past w occurred in different parts of the town, widely separa elevations. In some instances, drainage (natural) wa desired. Still a diphtheritic tendency has been notic throughout the summer—slight soreness and discolorat out diphtheritic patches. Most of the cases seen last families, where there was a decided want of cleanlines ciency of ventilation, with filth in the immediate vici contaminated water. The above, with the epidemic sufficient to develop the disease. Until the past winter, free from the disease.

Lawrence.—Diphtheria has been mildly prevalent in greater portion of the past year, although it cannot be the dignity of an epidemic until the month of Decembe cause are recorded in the city clerk's register for ever excepting January, February, and April. In March, the May and June, 3 each; in July, 1; in August, 2; in Sep 3; November, 8; and in December, 17; making a total year. The cases which have occurred in the city have part, of moderate severity, curable by prompt and sk ment, aided by efficient nursing. A severe type of th have prevailed in the adjoining town of North And Lawrence. The disease has found its subjects in nea this city; in the dwellings of the wealthier, as well as classes, though to a much less extent in the former; chiefly among the latter. The record of deaths shows of that portion of our citizens whose hygienic surrou higher order, and whose dwellings are the abodes of a fort. Two-thirds of the deaths were among our adopt children. One-half of them occurred in houses and in hygienic condition was a fair average of that which lower classes generally. The other half occurred in lo bific influences of various shades of bad, undoubtedly developing the disease. The same conditions did not ob In some, bad drainage; in others, close crowding in sma tilated; in others, the odors from a contiguous privy, damp cellars containing decomposing garbage were the which rendered the air of the dwellings unwholesome. a specific contagium hovers in the atmosphere around a lo the disease, exposing all persons who possess a suscep air and insufficient nutrition are the two factors which make the disease virulent and fatal. I believe the latte indirect cause of more deaths than the former. Perso air, warm clothing, and warm houses, with good substa cooked, would not, it is true, utterly stamp out the di probably deprive it in a great measure of its virulence tality to a very small percentage of its present rate; an tality would be still further diminished if those attack were promptly placed under good treatment. The p

ia by direct contagion is a fact of frequent observation, of which the
nt epidemic in this city and neighborhood has furnished many con-
atory illustrations. On the other hand, the value of prompt isolation
ne affected persons, and of the use of disinfectants to deprive the float-
germs of their pernicious energy, were strikingly exemplified in a case
ch occurred in North Andover, where the air seemed to be surcharged
the poison of the disease, and where many cases of a malignant type
ed fatal. The cottage, favorably situated, contained a family com-
d of three adults and five children, the oldest of the children being
n years old, and the youngest but three weeks old, the mother just
vering from her recent confinement. The oldest girl was taken sick with
disease, which proved to be of a putrescent character, and attended by
gerous hemorrhages and extreme prostration. After many days of
rtainty as to the result, convalescence began, and she made a slow and
ous recovery. As soon as the nature of the disease had been discovered,
ch was not until the physician had been called, who found the symptoms,
local and general, fully manifest, she was removed to another room,
attendants only being allowed access to her. All the rooms of the
e which were occupied, were daily thoroughly aired and filled with
fumes of burning sulphur. All the excretions of the patient were
oved in close vessels and buried, and the utensils disinfected. As no other
ber of this family contracted the disease, while in the immediate neigh-
hood, whole families had been prostrated by it (in one instance, five out
even stricken children had died within four days), the inference seems
e reasonable that the fortunate exemption of the four small children
three adults was due to the means employed to protect them.

ominster.—There has been but very little of diphtheria in this town
ng the past year, though there have been a good many cases of common
throat, some of them having small patches of exudation upon the fau-
All these cases were benign in their character. I know of but three
ilies where diphtheria (genuine) has appeared during the last year.
family lived in a house standing upon a sandy soil, with good drain-
The family consisted of father and mother, three children, aged 5
s, 2½ years, and 6 months old, servant girl (Irish), and farm boy (Irish).
boy 5 years old was seized first, and died on the fourth day, the dis-
extending to the larynx and air-passages. The servant girl had the
ase severely, but recovered; the farm boy was affected but slightly.
second child and babe escaped. In another family, in a different part
he town, three children, aged 7, 10 and 14 years, had diphtheria. In
of them, the air-passages were affected, but all finally recovered.
house in which this family lived was situated on wet land. I could
no cause of the disease about the premises, except the "soil-moisture."
third family consisted of three persons, husband, wife and daughter.
daughter sickened first and died on the twelfth day. The exudation
ymph extended to the air-passages. The mother, after taking care of
daughter for seven days, was seized with the disease and died after
days' illness, with congestion of the brain, apparently, besides the
at affection. They both died the same day. The mother was 45 years
the daughter, 16 years. The house was situated very near the putrid
am that carried the refuse from the tannery at the North Village to
Nashua River. You examined it last summer with Prof. Nichols. The
ok ran within three or four rods of the house. The husband escaped
disease. Of the eight cases, three were fatal.

Malden.—There have been from 15 to 20 reported deaths from diphtheria during the past year. I have personal knowledge of 4 fatal cases, in which there could be no doubt as to the diagnosis. There have been numerous cases of sore throat of more than ordinary severity, and which were, apparently, influenced by atmospheric conditions, or what is sometimes called an epidemic state of the atmosphere. There has probably been no month during which cases of scarlatina have not occurred. As sore throat is a symptom common to both diphtheria and scarlatina, it becomes difficult to ascribe with certainty, to one disease or the other, the unusual prevalence of inflammatory affections of the pharynx; in other words, scarlatinous and diphtheritic sore throat may be confounded. In some cases, the differential diagnosis is well-nigh impossible. The hygienic surroundings of houses where cases have occurred, have been usually bad. Malden has no system of public sewers. The cesspool is commonly used as a means of disposing of sink and water-closet refuse. Very few cesspools in the town are ventilated properly, if at all, and even the ordinary precaution of trapping is often neglected. Especially is this true among the poor and laboring classes, yet I have traced several cases of severe, and one or two of fatal typhoid, to the escape of sewer-gas into the houses of the "well-to-do," in consequence of combined carelessness and ignorance on the part of householders, which seemed almost criminal. The want of an efficient board of health, with one or more competent physicians as members, is making itself seriously felt here. Many citizens, jealous of their democratic right to poison themselves and their families, if they choose to do so, had rather "take their chances" of disease than have their premises subjected to rigid scrutiny, or which might result in expense to property-owners. Many people don't want to be "ridden by the doctors; what was good enough for their fathers, is good enough for them." The main fact of this nature to which I can refer, is, that the death-rate from filth-diseases is increasing, and the necessity of a good system of public drainage is thus forcing itself, year by year, more strongly upon the attention of all who have any interest in hygienic questions..

Manchester.—In this town diphtheria has occurred oftener among what would be regarded as the better class of people, and only occasionally among people who are most regardless of cleanliness, neatness, good air, drainage, etc. All this is negative, and argues nothing against the rules of health.

Marblehead.—Diphtheria has found its way into the best-located homes in the town, but I am quite sure has prevailed more extensively in low-land and poorly-drained districts. I have noticed a special increase in the number of cases just after a long rain.

Marlborough.—During nine years there has been no appearance of diphtheria coming to my knowledge, in this town, until within the last four weeks. Since then we have had between 20 and 30 cases, most of them light. Hygienic surroundings have been varied, with full as many cases occurring among families where surroundings were *very good*, as in those where they were below the average.

Medfield.—There have been but two cases of true diphtheria in this town during the last year. One case proved fatal; the other recovered after a tedious illness, accompanied with paralysis. The house in which the case proved fatal is badly situated, the ground low and wet, with no drainage at all, and hardly a chance for any; the other, not so bad, but on the border of low land, almost constantly saturated with water. Each house is rather small, with six or eight children.

Nantucket.—The house where the one case of diphtheria is, is situated on clayey soil, and may be called a damp situation compared with most of the houses here. Very little sickness of any kind has prevailed in Nantucket for a year past.

Natick.—There have been more or less isolated cases throughout the year, not, apparently, confined to any locality, usually in one family only in a given neighborhood. The surroundings have been varied, but not in any case, to my knowledge, bad. The disease has seemed capricious in its attacks, and more influenced by individual exposure to damp and cold than by any endemic bad influences. As to contagion, in one instance it seems proven. In March, the disease was epidemic in Hopkinton. Mrs. L., aged 30, of South Natick, widow, was about to be married; a sister, Mrs. C., came from Hopkinton to assist her in her preparations. The next day after her arrival, Mrs. C. was taken very ill with diphtheria; in six days Mrs. L. was seized, the disease invaded the trachea, and was fatal in seven days. A third sister, Mrs. R., came from Sherborn to help take care of the two first taken. Mrs. R. had a slight sore throat, but did not consider herself ill. She returned home, and two of her children were seized and died; they were not under my care. No other cases occurred in South Natick at that time, nor in Sherborn. The surroundings of both houses were good.

New Bedford.—Diphtheria has not prevailed in this city to any extent during the past year, a few mild cases recovering easily. A few cases of death from diphtheria have been reported in the newspapers, but, as these are based on hearsay or undertakers' reports only, they are to be received with caution.

Newburyport.—Our city has been exempt from diphtheria during the past year until within the past six weeks. During the months of November and December, we have had more cases than during the whole of the past six years. The cases have occurred without any regard to the hygienic surroundings. Some of the most fatal cases have occurred in what we consider the most healthy locations. One of the most severe cases (a young married lady, mother of one child) occurred in a house that has been built only eighteen months. The location of the house is good, and the surroundings are considered healthy; no other case occurred in the family. In one instance, in an Irish family, three children died within ten days, but there was no defect in drainage or water-supply to account for the fatality. My experience in the treatment of the disease has led me to believe that when the membrane extends into the larynx, the case will prove fatal; and when it is confined to the arch and soft palate, the patient will recover.

North Andover.—Diphtheria has been prevalent in one section of our town for three months past. The cases that have come under my immediate observation have been mostly of the better class, with comfortable surroundings, and have been of a mild type, with few fatal cases; it has seemed to me to spread by contagion. In one instance, where a whole family of five children died in one week, the children were poorly fed and poorly clothed;

all slept in one room, if not in one bed; and the water
low that it was *drained* three times a day to get water su
purposes. It has often been the case, however, where t
eral cases in one family with the same surroundings, that
case of great severity, while all the others were mild.

Northfield.—Our first cases of diphtheria were at South
ber, 1875. This place is a railroad junction, with a small
partly in Vermont and partly in Massachusetts. It is
place; it is located in the Connecticut River Valley, at
hill facing east, about three-quarters of a mile from the
water. The first case occurred at the hotel, and it was th
improper drainage was the cause. Others thought the c
boarder who sickened at the hotel, but went home (to Gr
setts), and had a mild form of the disease. At the same
another house, about 10 rods from the hotel, both provi
to four days. There was a party at the hotel four days b
hotel died. The other child above mentioned was at
with the family of a brother of the landlord. A few d
girl at the hotel sickened and died at her home just acr
her brother, a railroad employé, died of the same disea
the landlord, living some three-quarters of a mile south
tion, lost four children, falling a victim himself to the
family living near this family (not noted for sanitary r
nothing from the disease. We had 9 deaths—8 in Mass
mont: 6 males, 3 females; 3 adults—2 males, 1 female;
2 females. The disease next appeared six miles south, on
the river, the last of January, 1876. We lost 2 cases, b
and 1 child. Next appearance, one mile east of the villag
—2 males, 1 female; 1 adult, 1 child, and 1 infant two
appeared in the village in March. We lost here 5 cases, al
1 female. One fatal case in May; child, male. In July
children, and males, making 24 fatal cases—19 males, 5
4 males, 1 female; 19 children—15 males, 4 females. We
cases of a mild form, all recovering. Some were trouble
often attending this disease. I know of no cases now
ered fully. The hygienic surroundings of nearly every
theria prevailed was as good as could be asked for.

Pepperell.—Diphtheria has been unusually prevalent
the past year. In a population of about 2,000, there have
than 50 cases, varying in intensity from the mild to
type. In several cases, death occurred as early as the
invasion of the disease. Cases occurring in elevated situ
surroundings and in tidy families, have been more ame
and recoveries have almost invariably followed; while
crowded rooms, without regard to cleanliness, deaths hav

Pittsfield.—Diphtheria has not prevailed extensively
the year 1876. Of these, all but one occurred prior to
in November, viz. :—

n January,	2
February,	5
March,	3
April,	3
November,	1
	14

Aged 10 years,	1
7 years,	3
5 years,	2
4 years,	1
3 years,	2
2 years,	3
1 year,	2
	14

There was something wrong in the hygienic surroundings, in most cases. . Two fatal cases occurred in a house on the margin of a swamp. A woman nursing these carried the disease to her own children, without havng it herself; one of them died. 2. Three cases which recovered were in a ouse with a bad open drain close in the rear. 3. Several cases in a neighorhood where were several privies in a bad condition. 4. One fatal case n a very dirty house. Water was from a well in back yard. 5. One fatal ase in a very healthy location, and house connected with a sewer, but he child's sleeping-room was exposed to sewer-gas from a water-closet and rom the overflow pipe to tank, which was in a closet opening from the oom.

Plympton.—Diphtheria has been very prevalent here for the last four onths. I have had 18 cases and 5 deaths. The ages of those who have ved were from 30 years to 2 years. The ages of those who have died were rom 7 years to 11 months. Of those who died, all except one died with ymptoms of membraneous croup. One little girl of 11 months died in 24 ours after seizure, with symptoms of malignant scarlatina; consciousness eemed to have been lost from the commencement of the attack. In the amily to which she belonged five were sick with the disease, of whom two ied. The little girl that died was the last one who had the disease. Diphheria has become a very alarming disease. This family lived on high and ry land; they had been exposed to the disease from a person who came to he house, who had had it, but had partially recovered. All the other cases were situated in damp localities. So far as my observation extends, damp nd wet locations are the most favorable to it.

Princeton.—There have been 28 distinct cases of diphtheria in Princeton nce January 1, 1876. Twenty-three of these occurred after the 15th of ugust; 6 deaths took place, all after this date. There has been an nusual number of severe cases. The *fatal* ones were of the worst form, and uch as I have seldom seen since 1861. With one exception, they were all n one neighborhood. The ages were 2, 3, 7, 8, 9, 11 years. Twelve cases, occurring in *four* families, and including all the fatal cases, with one excepon, were in the south part of Princeton, on high land, one-half a mile or nore from Quinapoxet Pond. The exceptional case was a little girl who had een ten days in the infected neighborhood after the first cases took place, nd then went four miles away and had the disease and died. No. 1. Farmouse; first cases, three in number, and one fatal. The general appearance bout the premises not quite right, but not as bad as is frequently met with. There was an offensive puddle under the sink-spout on the west side of kitchen. There had been a stagnant pool in the barn-yard near the house. The well was in the cellar, and the water had been low and poor. No. 2. Near to No. ; children playmates of those at the other house; disease appeared about

the same time; 3 cases, and one fatal. The water dran
melted ice. I could find nothing objectionable about the
yard, on the west side of house, had been pretty wet for
but they had carted in loam to absorb it; hogs were k
No. 3. Near to other two; 2 severe cases, and one fatal.
cellar, and water low and poor. The sink-pipe passed in
which went through the cellar-wall immediately over the
it flushed over, the sink-slops would go into the well; t
well, at the time of examination, were wet with sink-wa
offensive hog-pen and privy in the shed adjoining the
hogs and pigs had their headquarters at the barn, and r
fields. Cellar of house dry. No. 4. One-fourth of a mi
but in the same neighborhood; 4 cases, and 2 fatal. Th
pied during the month of March by a company of ic
straw upon the floors for beds. When they left the pre
straw upon the floors, and decaying vegetables in the c
occupant moved into the house in April, and found the p
sive; he removed the straw and decaying vegetables and
He never used the well, but covered it up tight, thinki
good, and fearing that the children might fall into it; it
15 feet from the privy. Water was used from a sprin
thrown out of the back door and left there an unpleasant
any case diphtheria which has not the characteristic coat

Randolph.—Almost every very sick patient of diphth
cases, have been in families where the parents were of fo
people seldom, if ever, keep the surroundings of their h
condition as the American born.

Reading.—There have been about a dozen cases of dip
in 1876, one of which was fatal. There has been nothing
ered in the surroundings of the dwellings where these c
one exception. In one house in which two cases occurre
both of which recovered, and in which, four years ago, th
two of which were fatal, the privy was in the basement
were the apartments occupied by the family.

Rockland.—Within the last three months diphtheria h
locality of the main village of this town. During these
occurred in some five families, in four contiguous hous
a quarter of a mile distant, to which it was carried by a y
it from her cousin living in one of the aforesaid houses.
some 12 to 14 cases in all, with only one death so far, t
feeble. The locality is damp, hygienic surroundings not
in these cases, contagion, to my mind, has been the eff
spread and prevalence thus far.

Rockport.—Although in the neighboring city of Glouce
prevailed to such an extent as to produce 101 deaths, we
entirely exempt from it. I can call to mind only one
practice, which terminated favorably. I can therefore a
information on the subject.

lisbury.—I have seen but one case during the past year, and do not know
her in this town. An open drain from the sink-spout terminating in a
pool, a few feet from the back door, and around which the child was in
habit of playing, seemed to account for the case, which was one of
sual malignancy; there being no other children in the family, or near by,
disease did not spread.

ugus.—Diphtheria has prevailed here to a moderate extent. The main
ts to be noticed in the locality are: 1st. In the larger number of cases
as enabled to trace the disease to contagion, and not to local causes.
In some families, in spite of all precautions, all the children ex-
d were attacked in a severe form, showing a predisposition; others,
re no precautions were taken, escaped the disease. (This applies to
nly houses and well-to-do families.) 3d. The most noticeable fact is that
part of the town around the factories, where the children are the most
erous and exposed to all the vicissitudes of weather, where tenements
crowded and external surroundings not overclean, has been entirely
npt.

erborn.—There have been but two cases (in April, 1876), both in one
ily, one case being that of a little girl of less than four years, which ter-
ated fatally; she was decidedly strumous before, and has always been so.
other case was her brother, about 12 or 13 years of age; it was less severe,
he recovered. A brief statement of connecting circumstances may be of
rest. Less than a month before the date of sickness of the first child
girl), her aunt, who resided in Hopkinton (where diphtheria pre-
ed extensively), came to South Natick to visit a sister. She had hardly
ved there when symptoms of diphtheria commenced to appear. She was
sick, and barely escaped death. In less than a week after her arrival,
sister whom she came to visit was attacked violently with the disease
died in about a week more. The mother of the above children (another
er) nursed the sister who died, during the chief part of her sickness. On
return home, having a "sore throat," but with no diphtheritic appear-
es, although using many precautions against possible infection, she slept
the little girl the first night. In five days symptoms appeared in the
d.

rewsbury.—This family (in Boylston) are average livers, in a house which
ve always reckoned badly placed, by reason of a low, wet meadow
by. In this house I have seen two daughters die with pulmonary con-
ption, and a third was saved, as I believe, by sending her away. At the
time of this case, I was informed that in another part of Boylston there
three or four mild cases of diphtheria in one family.

merville.—Nothing especially remarkable can be alleged of those locali-
where diphtheria has really been present. Some have been in houses
re the basements have been objectionably damp, other cases have had the
t desirable surroundings. I have had no peculiar experience the past
worth reporting.

ringfield.—We have had but little true diphtheria. So far as I can ascer-
, the surroundings in all cases have been such as would make us expect
e one of the filth-diseases.

Stoneham.—I am not aware of any marked difference in the hygienic surroundings of the families in which these cases occurred. In none of them could they be called very good, but not worse than those of many houses in which there were no cases of diphtheria. This town suffers much, in my opinion, from the almost total absence of suitable drains, and no effort has been made of late years to introduce a water-supply. While Melrose, Malden, Woburn, Winchester, Medford, and other towns have secured an ample supply of water, we are still dependent on wells and cisterns.

Sturbridge.—The diphtheric cases have occurred, all of them, I think, at the tenement-houses belonging to the corporation. These houses, all or nearly all of them, have privies attached to them, with no sewers or outlets to the vaults, from which the filth is seldom removed, and the stench during the hot weather is intolerable. I sincerely hope measures may be adopted to correct the evil and to prevent a future outbreak of disease, which otherwise will certainly occur at no distant day.

Upton.—There has been more than a usual amount of diphtheria during the past year. If I should go back eighteen months and consider the diphtheria that has occurred during that time, it would probably amount to more than what had occurred here during the ten years previous to 1875. There have probably been about thirty cases during the eighteen months above mentioned, mostly severe cases. The worst cases have generally been those with bad hygienic surroundings—sink emptying at the back door on top of the ground, privy near at hand, and a well in close contiguity to one or both the others. Want of proper care and nursing have been prominent features of some of the cases.

Uxbridge.—I cannot give the percentage, but am sure that it has been more severe and of more frequent occurrence during the past year than during the previous year, and I think it has been the most frequent during the fall months. I have not been able to trace the cases seen to any special unfavorable hygienic influence. In one family of seven, consisting of grandmother, father, mother and four children, a farmer's family with the usual farmer's surroundings, the grandmother, father and three younger children all suffered, three severely; I could not find anything in or about the premises that I could consider the cause. I have felt that where the patient's breath was offensive, the contagion was more to be feared than where it was not offensive. The most severe series of cases in one family that I have ever had, occurred some years since in a family that had been living quite short or poorly, with very little meat. The first, a boy twelve years old, after cleaning out a damp cellar in early spring, barefooted and too thinly clothed, was soon after attacked, the disease apparently spreading to other children by contagion.

Wales.—I have had but one case, that being imported from West Warren, Mass. The child was visiting in this town, and, no doubt, contracted the disease before coming here, as it has prevailed to a considerable extent at West Warren, and was at the time prevalent in her neighborhood. In this case there were three other children in the family, all of whom had been in direct contact with the patient, one or more having slept with her up to the day of her death, and none of them were at all affected by it. The hygienic surroundings of the town are such as to invite disease, one case of malarial typhoid having proved fatal, directly from the effects of a recently flowed and at the time half-emptied pond, directly opposite the house. These surroundings are only atoned for by our high altitude and the fresh winds that sweep across the country. I am constantly surprised at the scarcity of typhoid, considering the positive attractions held out to it, and think it must come sooner or later if the conditions are not improved.

Waltham.—Diphtheria has prevailed in Waltham since June last to a considerable extent, there being more or less cases almost constantly under observation. It has been more prevalent and fatal than at any other time for the past six years. I have treated at least forty and, perhaps, sixty undoubted cases during the past six months, but I have no means, without special inquiry, of ascertaining how many have occurred in town, but I judge from 120 to to 150. The hygienic surrounding of the houses in which my cases have occurred have been apparently as good as those of other houses where the disease has not appeared, and probably one-half the cases have been the result of direct and ascertained exposure to infection. The dirtiest parts of our town have had the fewest cases, and I have not been able, in any single instance, to find insanitary conditions sufficient, in my judgment, to account for the production of the disease.

Ware.—There have cases occurred in families where the surroundings were all that could be desired, but such are the exceptions. In a number of cases the surroundings have been exceptionally filthy, with the greatest lack of cleanliness in the houses. Quite a number of the *fatal* cases have been in the overcrowded tenement houses, and in which there is a total disregard of dirt, outside and inside of the buildings.

Warren.—There has been more diphtheria in our town during the past year than in the twenty years preceding combined; indeed, until this last summer, I have not known of a severe case, unless some case of membraneous croup has passed unrecognized. There have been from twelve to fifteen deaths and from fifty to sixty cases. The first severe cases occurred at West Warren, in a new brick tenement block occupied by several families. There were two or three deaths in the first family; they moved away. No new cases occurred until another family moved into the tenement vacated, when the disease soon made its appearance in this family, with several deaths. I could not trace the disease to the drinking-water; there was water in the cellar to the house, and the family was large, both with young children. From this the disease made its appearance in several families in this village, generally among the foreign population. At this time there had been no cases in Warren; viz., during the summer. In October the disease made its appearance in a boarding-house in Warren. Two young men, fifteen and nineteen years old, died, one sick only three days, one seven days. This house was on crowded, low ground. There were several other cases in the house, which recovered. From this point the disease made its appearance several times. In some instances the disease could be accounted for by contagion from this house; others seemed to occur without evidence of contagion. In my own practice I have had two cases of paralysis following upon the disease, both coming on from four to six weeks after convalescence, and first affecting the muscles of the tongue and pharynx and then those of respiration, ending in both instances in death.

Watertown.—The disease in question existed (prevail
term) to some extent in Watertown during the first
present year. I have not seen a single case since the f
think I saw, during the early part of 1876, 20 cases of d
jects being children of different ages, from infancy to
enjoyed, so far as I know, a complete exemption. The mo
down at 20 per cent. After January 1, 1876, the disease, as
among people of better class than in 1875, and in locati
and free from qualities to which any sanitarian could ol
vated localities the disease proved fatal. A careful ol
showed that the constitutional intensity of the morbid p
constant relation to the extent and thickness of the ps
deposit in and about the fauces; for death occurred in o
fatal one in the family) in which the visible amount
pharynx was very much less than was noticed in two ot
ate severity in a neighboring house, which recovered. I
experience to see this disease in places that were hygieni

Webster.—I do not think "hygienic surroundings" ha
influence over the few cases of diphtheria in this vicinit
no epidemic of the disease, and the cases which have occ
every condition of life.

West Boylston.—Most of the cases occurred in low grou
lage, with no means of drainage; all the houses with a f
an eating-room—pig-pens, of course, to make the surrou
plete. Nasty foreigners, with one of the selectmen as ow
good; nothing but a stringent law will ever make th
place.

Weymouth.—In my last report I stated, I think, tha
months had any genuine diphtheria. Since July of the
been very prevalent, and in many cases it has proved fa
tacking a single member of a family, sometimes affectin
unable to state the exact number of cases, but it has be
some cases, the surroundings have been quite faulty.
been able to trace the disease to any fault in this directio
where there were four well-marked and very severe ca
slight ones, the location was high and dry, the house
drainage excellent, the cellar dry and sweet—the well bec
summer, and the family obtained their supply from a neig
wards; but no cases occurred in the family constantly us
last-mentioned source. Did it originate from the *low*
well? I have no doubt that outside influences help to
but the more I study its course, as it has appeared among
convinced that the physical condition of an individual,
tary or acquired influences, is a very important, and
important, element in producing this disease.

Williamstown.—At date, February 24, I have no kno
case of diphtheria in town; but during the last autumn
December and January, 1876, it prevailed here and in the
Pownal, Vermont, with fearful malignancy. I have not

the precise number of cases which have occurred here, but think that ıt 75 have been under treatment by the resident physicians. Of this ber (75), 25, or 33⅓ per cent., have died. Of the treatment I have little to The physicians here are presumably "up" in the literature of the ase, and made use of such remedies and appliances as experience has tioned, but without avail. The medical attendant often suffered the tification of seeing his patient die without being able to delay the event medicines or skill. . . . Of its contagiousness there is no shadow oubt, and if there is a relationship between it and scarlatina, as some pose, then the inference is indubitable that it may be conveyed by *fomites.* ink it can be so conveyed. In most country towns there are no sewers; he refuse of the house is received in open drains or thrown upon the ınd. This town is no exception to the rule. Where the disease first le its appearance, the soil was sandy, filled with quartz bowlders, and dry. families were of the poorer class, temperate, industrious, and moder- y clean. In one house, or rather shanty, where two deaths occurred, ry conceivable hygienic condition was wanting. Two cases, both fatal, place near the top of the Taconic Mountain, the rock of which is tal- slate, and the soil slaty gravel; hygienic condition of one house good, other bad. The lady of one house went and "laid out" the child which died at the other, took the disease, and died after a few hours' illness. ee houses in which ten cases of diphtheria occurred, nine of which were l, were located in a narrow, wet valley or ravine within a short distance each other, and the families held unrestricted intercourse (hygienic con- ions bad); but the families living in proximity, who adopted non-inter- rse, escaped entirely. Three cases, all fatal, happened at the Mansion ıse—a large and new hotel, situated on the highest point in Main Street, efully drained, and, so far as known, the hygienic surroundings are good. mbers of the family had daily intercourse with diphtheritic patients.

inchendon.—While we have had no cases of the disease in this town, 41 es have come under my knowledge or observation during the last two rs, resulting in 18 deaths. All these cases can be traced to three primary es. In one instance, 21 cases resulted from one primary, and 11 cases another instance, and 9 in another. The origin of two primary cases urred in houses in a *very bad* hygienic condition. One case from which 9 lted was evidently contracted while riding in the cars. So far as my erience with this disease is concerned, it has been due to contagion or ction.

inchester.—Diphtheria has prevailed more than at any time during the vious 12 years of my practice here, and I have been constantly on my rd against calling "tonsillitis" diphtheria. I lost 4 cases in March April out of 14 cases; and 1 case in December out of 5 cases. All the ths were of children under 4 years old, and 4 were of children under 2 rs. In all these the air-passages were invaded. So far as I am informed, more than 25 cases (including mild ones) have occurred here during the r. In every instance I made investigation, and failed to discover any nitary conditions of consequence. Two deaths in Irish family of 5; all cted. One death in Irish family of 6; 3 affected. One death in American ily of 3; all affected. One death in American family of 7; one affected.

oburn.—Occasional cases of diphtheria have been quite constant during past year; *i. e.*, I have seen cases in my own practice during every month

of the past year, excepting July and August. As a rule
mild, but few of the whole number having resulted fatal
ing the year 1876 having been reported or returned to t
rich and the poor, the filthy and the cleanly, have b
disease. Evidences of contagion have been appare
winter. I am of the opinion that, despite all the prec
board of health in isolating families in which scarlati
disease is propagated to a very great extent through
majority of instances, where this disease has invaded a
with some member of the family attending school.

Worcester.—It has prevailed to a much larger extent
any previous years. There has been an unusual num
throats, with and without exudation, with decided const
The profession are not agreed in calling these cases dip
ing that all cases of throat disease with exudation are d
nately we had no board of health or health officer to i
As to the percentage of fatal cases, I have no means
one family of five children—all died. The five cases w
basement tenement, with drunken parents—the worst p
dition. I have seen perhaps 12 cases in my own pract
families well-to-do,—modern houses with modern imp
the best to all external appearance, I found two wast
obstructed, and they were suffering from the effects of s
were immediately repaired, not another case occurring
cases have all recovered. In every instance I have t
cause, but have failed except in the one mentioned.
there were several children, but in no instance did a sec

Yarmouthport. Those occurring in February and Ma
bad surface-drainage, that is, the soil is sandy; but whe
time, the water did not flow off readily, so that on war
be a damp atmosphere surrounding the dwellings. The t
were surrounded by filth, the slops being thrown out at
times during the summer there was a stench arising.

The following interesting communication
Hulbert of South Dennis, is very suggestive
to the communicability of typhoid fever in
The wells are certainly open to suspicion, b
surface, and so easily affected by a common
the rise and fall of the water on the cran
The slowly progressive advance of the dise
to house, too, suggests the fact of gradual pol
wells. Dr. Hulbert, however, thinks that is
account of the great care taken in disposal
kinds of refuse from the houses. The directi
shed is southerly, too, whereas the disease p
ward. About thirty or forty per cent. of the

the easterly side of the meadow had the disease, four
ses only of the fifteen escaping entirely. The people from
westerly side of the cranberry meadow, who watched
n the sick, drank water from the same wells which the
er used, and were apparently exposed to the same sources
lisease, except that they spent a comparatively short time
the filth-laden air, and did not sleep in it. Moreover,
hoid fever occurred in a severe form in house No. 10, in
6, without spreading,—the air having been then pure,—a
which, of course, does not necessarily prove anything.
this time, it is perhaps impossible to do more than our
respondent proposes, in suggesting whether the most rea-
able explanation of the epidemic does not lie in the facts
ne has stated them.

I herewith send you a statement of an epidemic of typhoid fever,
t appeared in my practice during the summer and autumn of
4.

It occurred in a small village of about 26 dwelling-houses, situ-
l in the southern part of this town, lying on the seashore. The
ge is isolated and nearly surrounded by woods, except by the
on the south; in length, from east to west, it is about half a mile,
about a quarter in width. In the centre, and nearly dividing it,
cranberry meadow of about 17 acres. Originally this meadow
a cedar swamp, cleared, ditched, sanded, and set to cranberries
ut 12 years ago. Since that time it has been annually flooded
ing the spring until about the first of June, then let off for the
mer, no water remaining on the meadow or but little in the
hes. (See map on following page.)

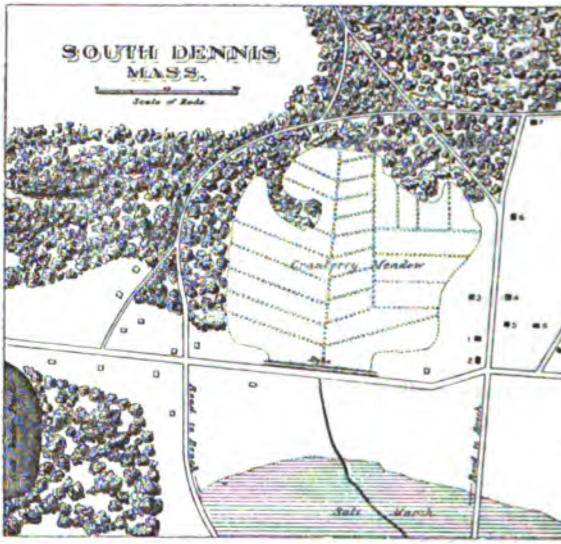
During the spring of 1874 the meadow was flooded deeper than
r before, and, when the water was let off, it was thought best to
it off by degrees, slowly; the ditches were left half-filled, and
r remained so until near the last of June. The last of the month
hot and dry. While the ditches were filled with water, they
me alive with tadpoles and other like living creatures. By July
r 10 the ditches became dry, and all the tadpoles and the
died, and consequently for some days—at least until past the
dle of July—there was observed a peculiar disagreeable odor or
ch arising from the meadow. The wind at this season of the
r is nearly always westerly, or south-westerly, which brought all
vapor and stench from the meadow into or onto the eastern por-
of the village. The land in this vicinity is composed of coarse
d; there is no pan or clay subsoil; from surface to any depth all

the same. All the inhabitants are supplied with The land is level, the wells varying but a few f being from 10 to 15 feet deep.

"When the meadow is flooded nearly all the both on the east and west sides of the meadow.

"The inhabitants are as a rule tidy and clean ings. Good care is taken with slop-holes, privies,

"On July 9 I was called to see W. W. G., age arrived that day from Boston by railroad; taken sic at sea on his passage from Philadelphia to Bosto with all the symptoms of typhoid fever in a mild him for about 20 days; he convalesced slowly.



"In the same house (No. 1 on diagram) July August 25, two sisters and brother of W. W. G. and had the fever.

"House No. 2, August 5 and 20, two taken.

"House No. 3, from August 9 to September 4, s

"House No. 4, one taken August 25.

"House No. 5, two taken August 26.

"House No. 6, one taken August 20.

"House No. 7, two taken about September 1.

"House No. 8, October 3, all the family, five, same time.

"House No. 9, one taken September 28.

"House No. 10, one taken September 5.

ouse No. 11, one taken October 25.

all about 26 cases; the majority had the fever in a mild form. but two patients, one aged 70, the other a vigorous woman of ubsultus was marked in 9 cases, rose-colored spots in six, deafness was observed in most of the patients.

do not pretend, after the lapse of nearly three years, to give all ails exactly correct, but they are sufficiently so for all practical es.

ow, what produced this endemic fever? and why did it confine ce wholly on the eastern portion of the village, as seen by gram, not even a single case appearing west of the meadow, hardly a house escaped the fever east of it. The inhabitants west side of the meadow watched and attended on the sick lay and night, and to all appearance were as much exposed se on the eastern, except from the meadow-stench and vapor. oradic cases of typhoid fever had often occurred in this village h sides of the meadow; but it affected only the members of two households.

ould it not be reasonable to suppose that the poison generated ditches of the cranberry meadow had so affected the eastern of the village, that, when W. W. G. came in with typhoid the infection found congenial soil in which to develop and gate itself?"

Death-Rates in Massachusetts for 1876.

AND TOWNS.	Population estimated to July, 1876.	Death-rate per 1,000.	CITIES AND TOWNS.	Population estimated to July, 1876.	Death-rate per 1,000.
,	346,000	23.84	Holyoke,	16,260	25.22
ster,	52,000	21.61	Newburyport,	13,500	21.85
,	50,000	22.92	Pittsfield,	12,267	21,92
idge,	50,000	19.32	Fitchburg,	12,000	21.50
ver,	46,000	24.13	Brockton,	11,000	17.00
nce,	35,000	24.14	Northampton,	10,785	16.87
	33,000	21.72	Malden,	10,543	18.78
field,	30,000	21.05	Chicopee,	10,361	21.52
	26,700	23.26	Milford,	9,800	18.67
edford,	26,000	22.92	Waltham,	9,800	18.87
ville,	22,000	20.18	Woburn,	9,650	19.17
a,	20,692	20.39	Quincy,	9,500	16.96
on,	20,500	20.39	Weymouth,	9,500	15.68
ester,*	17,000	25.35	Attleborough,	9,250	15.35
n,	16,500	17.03	Westfield,	8,700	15.40

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* This death-rate does not include 212 lost at sea from that port.

Estimated Populations and Death-Rates—

CITIES AND TOWNS.	Population estimated to July, 1876.	Death-rate per 1,000.	CITIES AND TOWN
Marlborough, .	8,500	14.00	Monson, .
Peabody, . .	8,200	17.68	W. Springfield
Natick, . .	8,000	15.50	Williamstown,
Marblehead, .	7,600	21.18	Everett, .
Brookline, . .	7,500	17.73	Greenfield, .
Beverly, . .	7,500	17.20	Abington, .
Clinton, . .	7,000	21.57	Hudson, .
Medford, . .	6,717	18.16	South Hadley,
Plymouth, . .	6,350	29.60	Dartmouth,
Danvers, . .	6,000	17.83	Deerfield, .
Dedham, . .	6,000	18.33	Holliston, .
Hyde Park, .	6,000	22.83	Sandwich, .
Amesbury, . .	5,987	9.52	Warren, .
Wakefield, . .	5,500	15.63	Dennis, .
Webster, . .	5,063	16.39	Montague, .
Westborough, .	5,200	14.81	Reading, .
Leominster, .	5,200	19.81	Foxborough,
Framingham, .	5,167	22.83	Harwich, .
Middleborough, .	5,100	16.47	Sutton, .
Stoneham, . .	5,100	14.90	Uxbridge, .
Watertown, .	5,099	23.73	E. Bridgewate
Andover, . .	5,000	19.60	W. Boylston,
Stoughton, . .	4,850	16.08	Winchester,
Needham, . .	4,700	14.25	N. Andover,
Hingham, . .	4,654	23.20	Oxford, .
Blackstone, .	4,650	11.18	Templeton,
Millbury, . .	4,500	19.77	Westport, .
Provincetown, .	4,500	19.33	Wareham, .
Grafton, . .	4,442	13.73	Concord, .
Gt. Barrington, .	4,425	15.14	Leicester, .
Hopkinton, .	4,400	24.31	Fairhaven, .
Methuen, . .	4,300	17.44	Mansfield, .
Medway, . .	4,250	18.11	Milton, .
Braintree, . .	4,400	18.33	Dudley, .
Rockland, . .	4,200	16.19	Saugus, .
Rockport, . .	4,200	22.85	Lexington, .
Canton, . .	4,192	12.16	Barre, .
Athol, . .	4,150	19.03	Swampscott,
Ware, . .	4,142	18.11	Walpole, .
Randolph, . .	4,100	16.83	Chelmsford,
Northbridge, .	4,050	14.56	Yarmouth, .
Arlington, . .	4,000	19.75	Belchertown,
Easthampton, .	4,000	14.75	Chatham, .
Lee, . . .	4,000	19.00	Duxbury, .
N. Brookfield, .	4,000	18.00	Sheffield, .
Salisbury, . .	4,000	18.50	Wrentham,
Amherst, . .	3,937	16.00	Sturbridge,
Easton, . .	3,900	26.41	Ashland, .
Winchendon, .	3,865	12.94	Hadley, .
Gardner, . .	3,800	12.63	Douglas, .

PUBLIC DOCUMENT...... ......No. 31.

EIGHTH ANNUAL REPORT

OF THE

BUREAU OF STATISTICS OF LABOR.

MARCH, 1877.

BOSTON:
ALBERT J. WRIGHT, STATE PRINTER,
79 MILK STREET (CORNER OF FEDERAL).
1877.

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Commonwealth of Massachusetts.

OFFICE OF THE BUREAU OF STATISTICS OF LABOR,
33 PEMBERTON SQUARE, BOSTON, March 1, 1877.

Hon. JOHN D. LONG, *Speaker of the House of Representatives.*

SIR:—I have the honor to present to the Legislature the Eighth Annual Report of the Bureau of Statistics on the Subject of Labor.

The Bureau has been engaged during the past year upon the completion of the census of 1875 and upon this Report, the principal labor, however, having been upon the census.

With the exception of Part VI., the various features of this Report need no comment. Part VI., "Massachusetts Manufactories," presents a great deal of evidence relating to means of escape in case of fire, of particular value at this time when a bill providing for the inspection of factories, etc., is before the Legislature.

In the introduction to the Seventh Annual Report of this Bureau the following language occurs: "We can not refrain from urging upon the Legislature the necessity of bringing under one organization the gathering and preparation of all statistics relating in any way to the condition of the people." I wish emphatically to repeat this recommendation; for, while firmly believing that the State can not and ought not to do away with the distinctive work of this office, I see no reason why it can not be as fully pursued in connection with other statistical work as under a separate department. The value and importance of a bureau of statistics are fully acknowledged by all, but why the State should keep up distinctive bureaus, engaged in statistical labors, is difficult to understand. This Bureau should not be abolished, however, till another department is formed on a scale broad enough to preserve its peculiar features and still be capable of serving the interests of the State in all required directions so far as social and industrial statistics are concerned. The value of the reports emanating from the various state offices increases from year to year, yet it can not be denied, as indicated in Parts IV. and V. of this document, that the "census developed the necessity of more uniformity in the general statistics of the State and in the methods of keeping the records of public institutions." And that "a central control of all statistical matters would secure simplification, avoid the duplication of work, and ensure uniformity and intimacy of connection in the presentation of facts by the several departments whose custom it is to report statistical information." *

I earnestly hope the present Legislature will take steps to secure results so desirable and so practically in the interests not only of economy, but of efficiency.

The completeness of the census of 1875, especially in all matters pertaining to wages, cost of material, value of products, running time of manufactories, classification of labor, hours employed, day and piece work, etc., etc., and the full presentations in this volume relating to fire escapes and the employment of people in different stories, would seem to indicate that no more investigations in the same directions need be undertaken for some years at least, although frequent reports upon the value of products and materials and upon wages would be exceedingly valuable. The grand desideratum, however, in statistical work is uniformity of classification and presentation, after, of course, accurate original entries. Without these, comparison becomes guesswork, and the labor and expense of the collection are lost in the labor and expense of the classification of facts.

The Bureau can not solve the labor question, for it is not solvable; it has contributed and can contribute much in the way of general progress. The labor question, like the social problem, must be content to grow towards a higher condition along with the universal progress of education and broadened civilization. There is no panacea. Intelligence, resulting from industrial and intellectual education, will produce grand

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* Address of Gov. Rice, January, 1877.

results in the amelioration of unfavorable conditions. The enactment of laws protecting the interests of the laborer, protecting his person from accidents, his rights to the schools for his children,—in fact, to drive his children out of manufacturing establishments and into the schools,—fostering plans for his securing cheap and comfortable homes, as contemplated by the Philadelphia system now before the Legislature;—these, with other measures, are all great helps, but not solutions; they are all elevating, but not concluding influences. Industrial arbitration and industrial copartnerships and co-operation are smoothing down the asperities which unfortunately exist between labor and capital, when ignorance on either side insists on a conflict between the two, and are fast convincing men that labor and capital are in a large degree interchangeable terms, and each in a separate capacity, dependent upon the other. One great consolation comes in to modify statements made upon platforms, and that is, that the struggle is an old one, that its history shows the social structure to be constantly on the brink of destruction, and that it has, on the contrary, as constantly risen to a higher and better condition. The resolutions passed in 1845 and thereabouts, in this State, as shown in Mr. McNeill's interesting history of co-operation in Massachusetts (Part II., this volume), have been repeated again and again every year since then, and their substance was often proclaimed during the centuries before; and yet conditions constantly improve, as shown in the admirable paper by Col. T. W. Clarke, on the motive power of Massachusetts (Part III.), and the relations of laborer and capitalist are more equitably adjusted, as the chapter on arbitration assures us, and as the constant announcements in the press of the settlement of difficulties by boards clearly prove. These desirable results are attained not by unhappy and unfortunate agitations, not by strikes and their consequent demoralizing influences, but by all the contributions to the sum of the intelligence of the laborer and the capitalist, and any means which the Legislature can adopt which will add to the information of the people on subjects which concern their daily lives are of untold value, and surely return to the government a hundred-fold. To popularize statistics, to put them before the masses in a way which shall attract, and yet not deceive, is a work every government which cares for its future stability should encourage and enlarge.

The plans of the Bureau for the ensuing year are in conformity with what has just been said, and the Ninth Report will contain much valuable matter drawn from the family schedules of the census and other sources, regarding the nativity of the people employed in the various pursuits, and other matter which not only interests and instructs but tends to attract the mind to the investigation of conditions with the view to their improvement.

I wish to acknowledge the continued valuable services of Mr. Charles F. Pidgin, chief clerk, and of Mr. Oren W. Weaver. The labors of these gentlemen have been of the greatest value in the vast work of the Bureau the past year. F. W. Draper, M. D., for his able analysis of returns relating to diseased conditions, Part IV., and Col. T. W. Clarke, for the intelligent chapter on motive power, Part III., deserve the warmest thanks. Acknowledgments to other gentlemen who have assisted in the preparation of this report have been made in the parts prepared by them.

Very respectfully, your obedient servant,

CARROLL D. WRIGHT, *Chief.*

PART I.

INDUSTRIAL ARBITRATION AND CONCILIATION.

PART I.

INDUSTRIAL ARBITRATION AND CONCILIATION.

The settlement of disputes arising between employers and
ployed by such means as will ensure the peaceful co-opera-
n of both parties, is a result which should be hailed by all
a step in advance, and indicates, whenever tried, a desire
adjust those questions which have been so fruitful of strikes
l consequent distress.

Manufacturers combine, dealers combine, operatives com-
e, and the results of all such combinations usually work
uriously to the parties engaged; and yet the right of
cery dealers to agree, in association, on prices for necessary
icles of food, or of railroad officials to say what wage
y will pay to their engineers, or of the engineers to hold
ir labor at a higher rate, or for the weavers in a mill to
ert, after consultation, that they will charge for their labor,
ich is theirs to sell, after such a date, so much per yard or
, can not be questioned as a right; but when the welfare of
ny is concerned in arbitrary action, and when prices are
ced by either side, so much temper enters into the question
t the principle involved is often lost sight of and the dis-
e becomes one of will, and the consequences are usually
reverse of those sought. The age of lock-outs and strikes
ast passing away and the rule of reason is rapidly asserting
elf,—and when it shall hold sway, capital and labor will
rn that their interests are identical and not antagonistic.
ch must be learned and much unlearned on each side be-
e the two interests can be brought to the full acknowledg-
nt of each other's rights and duties, and any information

which will tend in any degree to the establi
relations between the employer and the emp
freely circulated.

Arbitration in industrial matters is one of
broadest features of co-operation, and at the
the simplest methods for restoring harmon
exists. It consists in the reference of all
board consisting of members chosen by the e
the employed in equal numbers, the decision o
hearing, under established rules, to be bindi
This system, under various modifications, h
lently well in England, but has been tried
extent in this country, and this principally in

With a view to giving the people of Massa
regarding this important subject, we have h
only a *résumé* of the history and results
England, but have investigated the subject t
State.

Alsager Hay Hill, LL. B., editor of "The
London, Eng., has made the following repo
on the rise, growth and present status of ar
land in regard to the settling of disputes be
and employed.

ARBITRATION IN ENGLAND.

To the Chief of the Bureau of Statistics of Labor, Bosto

SIR:—In reply to your request for particulars re
growth, and present status of arbitration in Engl
settling of matters in dispute between employers
beg to report: According to Mr. Henry Cromp
work on industrial conciliation [London: H. S.
largely assisted me in the compilation of the
the first established system of arbitration was
the beginning of the present century, and was
impulse given by the French Revolution and to
class distinction. Certain legal tribunals were th
called the "conseils des prudhommes." They
employers and employed, and were authorized
putes that might arise between capital and labo
jurisdiction which enabled them to settle disp
wages or prices, or to fix terms of employm
moreover, these courts seem to have had a sem

to punish misconduct by the infliction of a fine, like the late
er and servants' act (30 and 31 Vict., c. 141).

obably arbitration in England owes its origin to these "con-
des prudhommes." Throughout the century disputes have been
d between employers and employed by resort to arbitration,
n some trades, as, for example, in the pottery trade, the prac-
rose of inserting an arbitration clause in labor contracts.

out 1850 the principle of arbitration was advocated as the best
s of ensuring peace between labor and capital. Prior to 1860
ondition of things in the hosiery trade at Nottingham was one
r between employers and employed. In 1860 there were three
s in one branch of the trade, one of which lasted eleven weeks.
neral lock-out was proposed, but, on the suggestion of Mr.
lella, three employers met a dozen leaders of the trades-unions.
ey consulted with the men and told them that the existing
was a bad one, and that the workmen took every advantage of
asters when there was a demand for them, and the masters
every advantage of the men when trade was bad.

first both masters and men viewed the new proposals with
cion, but at last a board of arbitration and conciliation was
d to. It was further agreed to refer all questions in dispute
board; and that the board should be composed of an equal
er of manufacturers and workmen, both to be chosen annually
eir respective bodies. The chairman was to be elected by the
ng, to have a vote, and a casting vote when necessary. The
g vote does not seem to have been a satisfactory arrangement,
atterly the chairman has not voted at all. The chairman being
s an employer, it has been thought undesirable that, where
is an equal vote, the decision should be given by an employer.
board has, therefore, come to a conclusion that in such an
there shall be a reference to some arbitrator to be appointed
e occasion. The proceedings of this board are very informal
ot like a court, but the masters and men sit around a table, the
interspersed with the masters. Each side has its secretary.
is, in connection with this board, a committee of inquiry, which
sts of four members of the board,—two employers and two
tives. If a dispute arises, it comes in the first instance before
o secretaries of the board. If they fail to adjust the difficulty,
rought before the committee of inquiry, but they have no power
ke an award. They can only settle the difference amicably by
onsent of both sides. In one of the rules it is laid down dis-
y that neither board nor committee will entertain any applica-
from men on strike. The condition of the board's action is
he men remain at their work. Every case has to pass through

the hands, first, of the secretaries and then of the committee, before it comes to the last of all,—the board.

There is a similar board for the Leicester hosiery trade. It dates from 1868. The board is composed of nine manufacturers, nine workmen and six middlemen; three of the latter being chosen by the masters and three by the men. There is a standing referee appointed, whose decision is final in the event of an equal vote; and the committee of inquiry consists of two employers, two workmen and one middleman.

At Derby a similar board has been established, which works satisfactorily.

In the Nottingham lace trade a board exists, similar to that in the Nottingham hosiery trade. This board is composed of twelve employers and twelve workmen. There are three different branches of the trade, and the board is a representation of these three branches. Six masters and six men represent one branch; the other two branches being represented each by three masters and three men. There are three committees of inquiry, each composed of three masters and three men,—one committee for each branch of trade. Every question arising out of one particular branch of the trade comes before the corresponding committee, and the matter must be considered by all the members of that committee before it comes before the board. The committee have power to make binding awards, but only with the consent of both sides, and not in cases where an award would affect others outside that branch. As in the Leicester board, there is a standing referee appointed annually, who is not an umpire to preside over the arbitration, but simply a referee, who is appealed to in case of an equal vote, and whose decision is always final. This board seems to have worked very successfully. The constitution and rules will be found at the end of Mr. Crompton's work on industrial conciliation. And the same writer says: "The representative character of the board appears to have two results,—one of satisfying the men that their case has been decided by men who really understand the facts; the other, that the work of conciliation is done by the parties actually concerned and not by strangers. The plan reduces the interference of strangers to a minimum, which is the very essence and principal merit of industrial conciliation."

It was not, according to Mr. Crompton, until 1860* that any permanent system or board of arbitration came into actual operation.

The two persons who have been most instrumental in this work, and whose names will long be remembered in connection with it are Mr. A. J. Mundella, M. P., and Mr. Rupert Kettle, Q. C. Mr. Kettle, a lawyer and judge, naturally approached the subject from a legal point of view. Mr. Mundella, a manufacturer and himself sprung from the working classes, went straight to the practical and moral end implied by the word conciliation. Mr. Kettle's scheme was based on a simple yet admirable application of the common law. A code of working rules was drawn up by the representatives of employers and employed. These rules were posted up in the workshops, and a copy was given to every workman engaged. The working rules, thus brought to the notice of the parties, became a contract, binding between each employer and every workman engaged by him; such a contract could be enforced at law.

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* For history of early attempts at arbitration in the silk and printing trades, see Crompton's Industrial Conciliation.

The following is a brief account of the rise and progress of the system of arbitration in the most important of the British industries:—

Manufactured Iron Trade.

The North of England iron trade was started at Middleborough about the year 1860. During the next ten years it developed enormously, and a large number of operatives were collected from various parts of England. Some came from iron works in other parts, many from other trades and a considerable number were Irish laborers. The history of the trade, says Mr. Crompton, was one of endless disputes, of deeply ingrained suspicion on the part of the operatives, of want of sympathy and understanding on the side of the masters. Strikes were of frequent occurrence. In 1866, the works were stopped for four months. The men had refused to submit to a reduction of wages, but were in the end forced to accept the masters' terms. "From that time to the end of 1868," says Mr. Samuelson, M. P., in a paper read before the Iron Trade Association, February, 1876, "repeated reductions in the wages of the men became necessary, and gave rise to feelings of resentment which rendered it more than probable that any increase in the demand for iron would be the signal for peremptory demands on the part of the workmen, tending to a renewal of the confusion of previous years and the destruction of the prosperity which all might otherwise hope to share." In 1869 the idea of bringing about a conference between the representatives of employers and employed arose, not only with a view of settling the wages dispute, but of establishing a permanent board like that in the Nottingham trades. March 1, 1869, after a preliminary meeting of the men, a conference was held, after which rules were drawn up and the board came into existence and has flourished ever since. At the beginning of 1876, the board represented thirty-five iron works and more than thirteen thousand operatives subscribed to the board. Besides these, large numbers of men are always connected with iron works who do not subscribe, but are nevertheless dependent upon its arrangements for employment, and who would be thrown out of work if a strike were to occur.

The works represented by the board contain 1,913 puddling furnaces out of 2,136,—the number in the whole district. The board has a representative constitution, each "works" sending two representatives, an employer and an operative; the latter being chosen by ballot for one year, but eligible for re-election. A president, a vice-president and two secretaries are chosen by the board for a year. They are not entitled to vote; but the "works" for which either was elected is entitled to nominate another representative in his stead. If the employer representative of any "works" happens to be absent, the corresponding operative representative is not allowed to vote. A standing committee, consisting of five employers and five operatives, the president and vice-president, is appointed by the board, and is exactly analogous to the committee of inquiry in the lace and hosiery trades. Its functions are defined by Rule 11: "All questions shall be in the first instance referred to the standing committee, who shall investigate and endeavor to settle the matters so referred to it, but shall have no power to make an award except by the consent of the parties." Failing settlement by the committee, it is at once referred to the board. In 1875 the committee settled more than forty disputes. Its decisions, or rather its recommendations, are generally accepted: appeal to the board is exceptional. If the board fails to agree, it appoints an independent referee to settle the dispute. There is no standing referee as in the lace trade.

Lately, disputed questions have been referred to two arbitrators, one chosen by the employers and the other by the men, an umpire being named whose decision is final. In the event of the arbitrators being unable to agree, each of them has to state his view to the umpire. Mr. Crompton is of opinion that there is no advantage in this course, which involves another hearing, further delay and increased expense. That plan would be best, he adds, by which the dispute was settled by one arbitration, and that as short as possible.

It is admitted on all hands that this board has proved a success.

There have been six arbitrations on the general question of wages since the board came into existence.

To quote the printed case laid before the recent arbitrators by the employers: "The board has been in operation since 1869, and during the whole of the intervening period the general district wages regulations have been settled without resort to strikes or lock-outs, and the employers most readily accord their opinion that, with a few local exceptions, which do not affect the general principle, the operatives, as a body, have been loyal to the rules laid down by the board."

In 1869, 1872 and 1873, large increases of wages were awarded, but eighteen months later wages sank forty-two and one-half per cent. This was effected partly by agreement and partly by award, and, in words of Mr. Crompton, "the men loyally stood to the awards, though they involved such enormous reductions." The last reduction, awarded by the arbitrators without reference to the umpire, was evidently a compromise. The whole proceedings are described as having been characterized by admirable patience and forbearance on both sides. In some of the outlying districts the men resented the decision and refused to work, but their leaders, especially the late Mr. John Kane, insisted on the importance of their keeping faith. In two or three days all the men were at work, quietly, at a reduction of fifty per cent on the wages of 1873.

On the 24th of February, 1876, at the first meeting of the Association of the British Iron Trade, Mr. Samuelson, M. P., read a paper upon the success of the Board of Arbitration and Conciliation in the North of England Manufactured Iron Trade, advocating the establishment of similar boards throughout the trade. He said that "arbitration in a more or less organized form is now accepted in the manufactured iron trade of South Staffordshire, South Wales and Scotland, in the ironstone mines of Cleveland, and in all the principal coal-mining districts of England and Wales."

A resolution moved by Mr. Samuelson was not pressed, but the discussion was indefinitely postponed.

Arbitration in the South Staffordshire Iron Trade.

The success of arbitration in this trade has not been an uninterrupted one. It was formed upon the basis of the two organizations in the district, the South Staffordshire Iron Masters' Association and the local branch of the Iron Workers' Union. The board only represented these associations, but a new South Staffordshire board has since been established. The constitution of this board is not the same as that of the North of England board. It consists simply of twelve masters and twelve operatives, but every "works" joining the board shall, if possible, have a representative of the employers and a representative of the operatives. The board elects a president, not connected with the iron trade, whose duty it is to attend at meetings when questions are brought before the board to be settled, but to take no part in the discussion beyond asking explanations sufficient to guide his judgment. He has not to give an award like an arbitrator or an umpire, but in the event of an equal vote, he would have to decide then and there by his casting vote. The South Staffordshire board has already accepted the result of an arbitration. Besides the president, there are a chairman and a vice-chairman, who are elected by the board from amongst themselves. Instead of a committee of inquiry, the rules say that "in case of any difference arising at any works, it is intended that it shall be settled by their works' representative; but in case of their failing, it is open to them to refer it to the chairman, vice-chairman and the two secretaries, who may call the board together if they see fit."

The Coal Trade.

Arbitration in the coal trade is now firmly established. As yet, however, no permanent board has been established. When a dispute arises arbitrators are chosen on each side, and an independent man is fixed upon as an umpire. In the Northumberland coal trade, although there is no permanent arbitration board, the masters and men have for some years met together and discussed and settled all questions "of mere local importance affecting individual pits." The committee has no authority to deal with the larger question of wages; nor is there any board which has such authority. The arbitrating board is created for the occasion.

In the Durham coal trade the same system prevails. Great as the fluctuations and difficulties have been, arbitrations in Northumberland and Durham have been successful, and have been loyally adhered to by employers and employed. Arbitration in the coal trade has now become common all over the country, and the refusal to submit to it is regarded as equivalent to a weak case. In one colliery in South Wales, the men complained of the neglect of their own arbitrator and refused to accept his award. There have been successful arbitrations in Ashton-under-Lyne, Oldham, North Staffordshire, Cleveland and the North of England. In South Staffordshire a sliding-scale wage was agreed to after the strike of 1874 by a joint committee of employers and employed. At Radstock there have been two awards. In the South Wales steam-coal collieries the men have remained loyal to a most unfavorable award. At Mold in North Wales, in 1869, there was a formidable riot. Experience in South Yorkshire and North Derbyshire coal trade has not been as yet satisfactory.

It may, however, be stated that a strong wish is manifesting itself among colliers in all parts of the country to settle disputes without recourse to strikes on the one side or lock-outs on the other.

Other Industries.

According to the record of Mr. Crompton, the English working-classes have given the most favorable reception to the proposal for courts and boards of arbitration or conciliation. As far back as 1866, Mr. George Odger introduced the subject of arbitration at a large meeting in Sheffield, and then expressed his opinion that strikes were to the social world what wars were to the political world: they became crimes unless they were prompted by absolute necessity. Where industries are not localized, but, on the contrary, scattered over the country, arbitration arrangements necessarily become more difficult. In the more highly organized of these trades, the question of wages is not so often raised by arbitration, and in some very slight alterations have taken place in a long series of years. The engineers have, as in the case of the nine hours' strike at Newcastle in 1871, so ably recorded by Mr. John Burnett, the secretary of the Amalgamated Engineers, been willing to submit questions in dispute to arbitration, but the great variety of operatives employed in this industry makes the system more difficult to adjust satisfactorily. Mr. John Burnett has, however, expressed his opinion that "a scheme of arbitration might be arranged so as to apply to the various peculiarities of the engineering trade."

The brass workers have made an experiment in arbitration, but it does not seem to have been successful.

In the building trades difficulties arise similar to those in the engineering; up to date no representative board has been created in the metropolis. At Wolverhampton a board was organized by Mr. Kettle in 1865, but its later working has not been altogether satisfactory.

At Wolverhampton, Worcester, Birmingham and the potteries regular conciliation boards have been established, but the meetings do not seem to have been regular enough to ensure thorough efficiency in the working.

At Sheffield the employers did not seem disposed to meet the overtures of the men who, through the carpenters, desired to form a board.

The bricklayers can not be reported as having distinctly pledged themselves to the system of arbitration, but Mr. Coulson, the secretary of the Operative Bricklayers' Society has endeavored to establish boards as opportunities have arisen.

The masons have not as a class shown so strong a desire for arbitration as the other classes of building operatives, and, in the language of Mr. Crompton, "they have a conservative tenacity which tends to prevent them from changing some practices which can not stand the test of criticism." At Bristol, however, a code of rules has been drawn up between the Masters' Association and the Operative Stone Masons'. One rule provides that "six employers and six operatives act as a standing committee to hear and determine any minor disputes that may arise from time to time as to the intention and working of the rules, and their decision shall be equally binding on both parties, and no suspensions of labor shall take place pending the decision of the conciliation committee."

Among painters, though there is no permanent board in the trade, a code of working rules was established at Manchester in 1870, agreed upon by six operatives and six employers. According to this code there must be six months' notice of any change, which is settled by conciliation, if possible, if not by reference to some arbitrator. At Birmingham, Coventry, Leicester and Nottingham arbitration has also taken place in this branch of trade.

In the potteries a board of conciliation and arbitration has been in existence since 1868 for the china and earthen ware manufactories. The board is established on the model of the Nottingham boards. "The president presides over such meetings of the board as are not convened for the purpose of arbitration; but a standing referee presides over all arbitrations by the board, and his decision is final in the event of an equal vote." Mr. Crompton points out that the advantage of this seems to be that the referee is not called or arbitration attempted until the board has failed to settle by conciliation; in which case there is to be one final arbitration arrived at, if possible, without difference. The award is made subject to a month's notice on either side. The settlement of the prices of labor is, however, for a year.

In the chemical trade of Northumberland and Durham, a board of arbitration and conciliation was established in 1875, but it is of too recent formation for any results to be reported. This board has a by-law specially directed against strikes and lock-outs.

In the boot and shoe trade no board of a formal character has yet been established, but a resolution has been passed at Stafford in support of one in the future. At Leicester, also, steps have been taken recently to form a similar board.

In the textile trades, as far back as 1849, a voluntary court of arbitration was established at Macclesfield between the manufacturers and the weavers in the silk trades. This board, which was called the Macclesfield Silk Trade Board, was composed of twelve manufacturers and twelve weavers, a chairman and secretary, not members of the board. This board lasted for four years, but broke up in consequence of a leading employer refusing to abide by the rules or the system of fines and coercion, and a strike taking place to compel his subordination to the board.

In the woollen and worsted trades of Yorkshire there have been no boards of arbitration or conciliation, nor has arbitration been resorted to as a means of settling disputes.

In the East Lancashire cotton trade there is no system of arbitration or conciliation, but committees composed of employers and employed are appointed from time to time for the purpose of settling disputes, and they argue the question till one side gives in. Mr. Birtwhistle, the secretary of the East Lancashire Amalgamated Weavers' Association, is of opinion they ultimately will have to resort to arbitration.

In the printing trade a court of arbitration was established in 1853, but the court broke up, because the men, while accepting the award as a decision in an actual dispute, refused to accept it as a decision binding in all other cases arising out of past contracts and involving similar questions.

In the Typographical Trades Union, arbitration has been suggested, but not yet adopted.

At Manchester, a question in dispute has been settled, however, in conference between the masters and men in the printing trade.

Among unskilled laborers, with the exception of the laborers who are represented on the Birmingham board in the building trade, no settled form of arbitration has as yet been arranged, and until this large class is more thoroughly organized within its own lines by union, such arbitration will be difficult, if not indeed impossible.

Among agricultural laborers, into whose ranks the spirit of organization is fast infusing itself, no arbitration has yet taken place; but Mr. Howard Evans, editor of the "English Laborer," Mr. Crompton and others have written in favor of the adoption of the system in future disputes.

The above *résumé* of the progress and present position of industrial arbitration is not complete, but is sufficient to indicate the direction and extent of the movement up to date. And, it may be stated, in the language of Mr. Crompton, as the result of the investigation, that "there is now a complete trust and firm belief among the working-classes in the wisdom of conciliation; that there is a very strong feeling among a very large majority of the artisans in favor of arbitration; but that in several trades there have been failures and disappointments in the results and a want of confidence in arbitration by a court or by a stranger."

The main difficulty of arbitration must arise from the want of knowledge of detail and all the circumstances of the situation which accompanies it, and there has been a noticeable tendency in a large number of arbitrations towards a compromise, in place of an absolute judicial decision on the merits. As a whole, however, the system of arbitration in industrial disputes, growing as it has done in so short a time and extending itself into almost all trades, must be pronounced a decided success, and recent indications seem to point to a more complete development in the future.

The following (January, 1877) is characteristic of the present satisfactory position of arbitration in the North of England iron trade:—

"*Ironworkers and their Wages.*—It is stated that the following communication has been sent to the secretary of the Ironworkers' Association: 'The employers, members of the board of arbitration, have considered the wages question and then otice that was given by them early in October claiming a reöpening of the whole subject. They find that the statistics brought out by Mr. Waterhouse's quarterly investigations have shown that the claim for a reduction of fifteen per cent that was made a year ago was fully warranted, and, therefore, they consider that they are now entitled to a reduction equal to the whole amount claimed in January last year. They have, however, taken into consideration all the circumstances affecting the case, and have come to the conclusion that they will not press for further reduction on wages. In adopting this course, it must, however, be distinctly understood that the employers clearly maintain that they do not accept the present relation of wages to selling prices as any standard for the future. They hope that the future course of the trade may be such as will render it unnecessary to ask for any further reduction in wages; but they trust that, whatever the condition of things may be during the current year, the good relations that have so long existed between employers and employed in the North of England may be maintained.'"

As showing the position of various influential newspapers, the following extracts from their columns are given:—

THE PRESS ON CONCILIATION IN AGRICULTURE.

[From the Norwich Mercury.]

Give us the wisdom of the serpent and the harmlessness of the dove, ought to be the prayer of the Norfolk Chamber of Agriculture. The National Agricultural Laborers' Union Executive Committee have directed that a communication be sent to our local Chamber, asking it to take the first step toward the establishment of a board of conciliation. If the reply be a refusal to move in the matter, the Union may, and probably will, ask the public generally to see for themselves how ill their good intentions to reëstablish amity and good-will have been met. We do not doubt that a portion of the Chamber would be in favor of a refusal, on the the ground that that body has no authority to treat with, as it certainly has not yet recognized, the Executive Committee of the National Agricultural

Laborers' Union. But if we recognize that the relations of employer and employed are rapidly becoming strictly business relations, and that this is very likely soon to be the universal rule, we see that the Chamber is well adapted to serve the same office for the masters which the Executive Committee of the Union serves for the men. As, moreover, the men, by their agents, bring forward the proposal, the employers can, with good grace, meet them half-way. The experiment is well worth trying over so large an area, and the more so as Norfolk has so many gentlemen who, by their practical knowledge, would be acceptable to all parties, were they to consent to act on a board of conciliation. The experiment would be a new one in agriculture, but it has been tried, and the scheme has worked well for many a year in some trades in France, and of late in many occupations in the North of England. The cases of dispute that would arise here would be few, as most men are open to the argument of plain facts, but the few cases which need to be fairly discussed before a board are just those which lead to strikes and to much ill feeling.

[From the London Echo.]

The governing body of the Laborers' Union have taken the hint given by a member of the Norfolk Chamber of Agriculture. They have frankly and voluntarily offered to assist in establishing a board of conciliation in that county. Mr. Read, in his recent address at the Farmers' Club, said, that he longed for the old feeling of confidence and harmony between farmer and laborer to return once more. He now has a splendid opportunity of putting his benevolent yearning into practice.

[From the Mark Lane Express.]

We shall refer to the subject at greater length on another occasion. This, however, we can not refrain from saying, that any proposal made in the interests of peace and settlement should be favorably entertained and discussed with a sincere desire that something practical may come of it.

[From Reynolds's Newspaper.]

Let us hope from this favorable opening in agriculture we are not far off from the day when a cordial state of feeling between farmers and laborers will lead *both* to the consideration of the wisdom of the laws which now influence the devolution and culture of land. The farmer will never get released from abominable game laws which now eat up his crops, from an insecure tenure not at all provided against under the agricultural holdings act; nor from entail and primogeniture, until he has the help of his laborers' votes in the election of a House of Commons opposed to game laws, to uncertain tenures, and to iniquitous laws of entail. All these considerations will come, for they affect the price of the food of the people, and the people of England are not going to tolerate entailed estates in England any more than they will tolerate pashalics in Turkey.

[From the London Echo, Jan. 3, 1877.]

The Executive Committee of the National Agricultural Laborers' Union have adopted a resolution which will, in all probability, have a most important effect on the future relations of farmers and laborers. The Secretary of the Union was directed to write to the Secretary of the Norfolk Chamber of Agriculture, requesting that body to appoint a provisional meeting with a view to the establishment of a permanent board of conciliation for agricultural work in Norfolk. This resolution in itself may appear of small importance, but, taken in connection with the circumstances which have led up to it, it may be fairly regarded as the advent of a new era in agricultural wages, in which the mutual hostility of employers and employed shall at all events be moderated and controlled by reason. At a recent meeting of the Norfolk Chamber of Agriculture, Mr. Rose, a Wymondham farmer, stated that he had made inquiries as to the operation of boards of conciliation in some of the manufacturing districts, and that the results appeared to be most satisfactory. Although no definite action was taken at the time by the Norfolk Chamber, Mr. Rose's judicious speech has evoked a hearty response from the governing body of the National Agricultural Laborers' Union. The experiment of conciliation has never yet been tried in agriculture, and perhaps Norfolk would furnish a more favorable field than any other county in England. A board of conciliation works best where the men are well organized, and in the county of Norfolk the National Union has nearly ten thousand members, some few hundreds besides belonging to smaller organizations. In Norfolk, too, the employers have an influential Chamber of Agriculture and a Farmers' Defence Association, while the prominent position of such men as Mr. Clare Sewell Read, Mr. Henry Woods, and other employers in agricultural circles, is likely to lead to the adoption of conciliation in other counties, if Norfolk sets the example.

The proposal to establish a board of conciliation could scarcely have come at a more opportune moment. Though the Union is just now supporting a small number of men, principally in the eastern counties, in their resistance to a reduction of wages, there is no great dispute pending at the present time, and the bitter feelings aroused by the great lock-out of 1874 have passed away. The Union, too, was never so strong in numbers or funds as at the present time, its balance in hand, which is only applicable to trade purposes, amounting to nearly £10,000. The overtures of its executive are made, therefore, at a time of peace and prosperity. On the other hand, the moderate tone of the discussion at the Farmers' Club, last month, shows that on the part of leading agriculturists at any rate, there is some disposition to accept the combinations of labor in the rural districts as a permanent force, to be dealt with from a rational and commercial point of view. Mr. C. S. Read, M. P., though with evident reluctance, accepts the Union as a permanent institution, and bears testimony to its power as a "united and well-drilled organisation." There is good reason to believe that some of the leading farmers in Norfolk, though their faith in conciliation may not be strong, are quite willing that the experiment should be tried. Considering that the results will probably be satisfactory to both parties, and are hardly likely to do injury to either, the question at once arises, Why not?

Even arbitration (much less conciliation) has not yet had a fair trial in disputes between farmers and laborers. In 1874, Messrs. Morley and

Dixon succeeded in putting an end to the Lincolnshire ock-out, though they failed in Suffolk and Cambridgeshire. But when that failure occurred the strife had been embittered by a lock-out of several weeks' duration, and the passions of both parties had been thoroughly aroused. There is a wide difference between an attempt at mediation when both sides are fiercely fighting for victory, with strong hopes of success, and the reference of a dispute at the very outset to a board of conciliation, composed of employers and employed. Unionist laborers, before claiming the support of their society in a dispute, are bound to submit to arbitration whenever it is offered; that this rule has not been put into operation hitherto is simply due to the fact that the farmers never would condescend to submit to arbitration.

It is certain that in several of the great trades industrial conciliation is no longer a bold experiment, but a permanent and successful institution. In the Nottingham hosiery trade there has been a board of conciliation, established mainly by the exertions of Mr. Mundella, ever since the year 1860, and with most satisfactory results. The difficulties in this case were by no means small, since all the men are paid by piecework, and statements of prices are fixed to no less than 6,000 articles. The Leicester hosiery trade and the Nottingham lace trade have had similar boards in operation for a considerable time. Still more remarkable has been the success of conciliation in the extensive iron trade at Darlington. In 1869, a board of conciliation was established in that district, which now represents thirty-five iron works and more than thirteen thousand workmen. In 1875 the standing committee of this board settled more than forty disputes. Since 1869 the board has referred six disputes on the general question of wages to arbitration, and the decisions have been loyally accepted, though the men have within two years had to accept a reduction of wages amounting to fifty per cent on the prices paid in 1873. In the coal trade, though arbitration has been generally resorted to of late, and with but few exceptions successfully, boards of conciliation have not been established. On the occasion of a dispute the refusal to submit to arbitration is becoming rare, and still rarer the refusal to abide by the result of such arbitration. Boards of conciliation have also been established in connection with the building trades in several of the great towns, and with marked success. There have been a few cases in which the plan has failed to adjust disputes, owing sometimes to the disloyalty of the employed, and sometimes to the disloyalty of the employers, but these exceptions to the general rule have been few and far between.

One of the most prevalent, but groundless, popular blunders is the idea that trades union leaders are the chief promoters of strikes, from which they reap rich harvests. As a matter of fact, a strike brings to a union officer no additional pay, but a large increase of labor and anxiety. His personal interest lies rather in restraining the eager, impatient spirits among the men. In the oldest and best organized unions it may be calculated as certain that a union officer will never counsel a strike unless in what he considers a case of absolute necessity. From the same motives which compel him to be cautious when a strike is imminent, he will be sure to use his influence to induce the men of his trade loyally to accept the decisions of a board of conciliation, or of duly appointed arbitrators, as the case may be. Again and again have trades union leaders rendered valuable service to the whole community, by bringing the weight of their influence to bear at critical times. In the North Wales coal trade, Mr. Horatio Lloyd, the county court judge, has borne testimony to the earnest efforts of the leaders of the men to induce them to be true to the awards of arbitrators. In the iron trade, the late Mr. John Kane, secretary of the ironworkers' society, rendered great service in the same direction. The board established in the South Staffordshire iron trade found their great difficulty was with the men who were *not* in the ironworkers' union. It is well that these facts should be widely known at the present time, as only last week a writer in the "Agricultural Gazette" made the erroneous statement that in some of the manufacturing trades the unions had not been loyal to the decisions of the arbitrators. Should conciliation be established in agriculture, it will not fail through the disloyalty of the officers of the union.

There is one great obstacle to the successful operation of boards of conciliation in the rural districts which does not obtain elsewhere. It lies in the fact that the laborers, many thousands of whom in this winter season are earning but eleven shillings, twelve shillings, and thirteen shillings per week, owe their miserable poverty, for the most part, to political causes, and that to legislation they must mainly look for a remedy. The foreign producer of food is protected at the cost of the home producer, by game preservation, by insecurity of tenure, and by our iniquitous land laws. The laborers are unenfranchised, and can only act at present by squeezing the farmers so tightly that from sheer necessity they may be compelled to throw off their political bondage and insist on the redress of their grievances. Were boards of conciliation at once established throughout the rural districts, the immediate effect might be that such pressure would grow lighter rather than heavier, a result to be deprecated alike in the interests of consumers, producers and laborers. But the adoption of conciliation throughout the country must necessarily be a work of time, and ere the experiment now first proposed becomes anything like a general and permanent institution, in all probability the laborers will, by their admission to the polling booths, have an opportunity of pressing the common claims of employer and employed upon the House of Commons.

Be that as it may, the governing body of the Laborers' Union have taken the hint given by a member of the Norfolk Chamber of Agriculture. They have frankly and voluntarily offered to assist in establishing a board of conciliation in that county. Mr. Read, in his recent address at the Farmers' Club, said that he longed for the old feeling of confidence and harmony between farmer and laborer to return once more. He now has a splendid opportunity of putting his benevolent yearnings into practice.

HOWARD EVANS.

ARBITRATION IN MASSACHUSETTS.

Following is an account of the principal attempts at arbitration in this State. But little has been done in this country other than as recorded. The data for this part of the report have been furnished by Mr. John Carruthers of Lynn.

In the collection of facts relating to the subject of arbitration in Lynn between the shoe manufacturers and their workmen, one of the chief difficulties has been, that scarcely any record of their doings has been kept by either party. Indeed, most of the agreements between employers and their employés seem to have been verbal; and though in some cases written compacts have been made and signed by both parties, but few have been preserved, and these only show the results reached.

Many of the shoe manufacturers can recollect, in a general way, that at various times they have had disputes and difficulties about prices with their workmen, but exactly the questions involved, or how finally settled, they have now very vague impressions. Therefore the statements herein made are fragmentary, being gathered by repeated personal interviews with such manufacturers and workmen as, from their position, were prominent and active participants in the various troubles that have arisen during the last seven or eight years in this city. It is pleasant to be able to say, that, in making the necessary inquiries, only the most courteous treatment has been received from those appealed to for information; there is also every reason to believe that the statements made have been truthful and correct, according to the best recollections of the persons questioned. As any account of arbitration in Lynn must necessarily be on one side a part of the history of the order of St. Crispin, some facts with regard to that organization and its methods seem indispensable to a proper presentation of the subject, and required at the very outset.

Sometime in the year 1864, Newell Daniels, then living in the town of Milford, Mass., conceived the idea of organizing the shoemakers of that place on the plan of not allowing any one to teach the trade to new hands, without first obtaining the consent of the organization. He went so far as to draft a constitution, and along with Stephen Onion and Elba

Underwood, took some steps toward forming a boot-treers' society upon that plan. Before the preliminary arrangements were completed, however, Mr. Daniels left Massachusetts, settled in the West and for the time being the matter dropped.

About two years afterwards, Mr. Daniels, with some others, succeeded in organizing in the city of Milwaukee, Wis., a society of shoemakers, comprising all who had worked at any branch of the shoe-trade for the space of one year, with the restriction that no member should teach his trade to any one unless by consent of the organization. The constitution written by Mr. Daniels was adopted, and a committee, consisting of W. C. Haynes, F. W. Wallace and Henry Palmer prepared a secret ritual, which at the next meeting was adopted by the organization. F. W. Wallace gave the new society its name,—The Knights of St. Crispin.

They soon afterwards engaged a hall as a place of meeting, and on the 1st of March, 1867, in the city of Milwaukee, established the first lodge of the order. Very shortly thereafter the German custom shoemakers' union of that city adopted the plan and principles of the order, and founded a second lodge. Both lodges increased very rapidly in numbers and influence, and soon commenced active exertions to introduce the order in the Eastern States, and finally, to form a national organization.

Circulars setting forth the plan and principles of the order were prepared and sent to all parts of the country where it was known that shoes were manufactured. By these means Crispinism was introduced into Eastern Massachusetts, where it spread with great rapidity through all the shoe towns.

On the 3d of March, 1868, the first lodge was formed in Lynn,—Unity Lodge, No. 32,—and in less than a year two others were added, the three having a membership of about 5,000. On the 23d of April, 1869, a general convention of the order was held in Worcester, and a preamble and constitution for the International Grand Lodge adopted.

The effects of the revolution, through which, as is well known, the entire shoe business was at that time gradually passing, were nowhere more felt than in Lynn. The complete and final change of methods brought about by the introduction of steam power and labor-saving machinery, and the consequent subdivision of labor whereby production was greatly increased and cost reduced, the employment of unskilled labor being allowed to an extent before impracticable, were of course disastrous to small manufacturers, whose business now began to be absorbed in larger firms.

The small-shop system was mostly abandoned, and the large-factory system adopted in its place. The Lynn shoemaker, hitherto more or less independent in the management of his business, began to sink into the mere operative, and in place of making a shoe throughout, as formerly, was obliged to work continuously and monotonously at one or another of the thirty or forty branches into which the industry, under the new system, was divided. He thus became a cutter, a laster, a heeler, a beater-out, etc., or was set to run a McKay sewing machine, a skiving machine, a pegging machine, etc., in any of which labors the skilled shoemaker found that the knowledge and experience gained by years of practice gave him little advantage over the green hand.

The natural result of this state of things was to give to the large manufacturers, who could command the necessary capital, a manifest advantage over those of smaller means, who were still struggling along in the business. This is, no doubt, one of the reasons why the small manufacturers looked with more or less favor on the combinations of workingmen, and in particular on their efforts, by means of the Crispin organization, to keep up the rate of wages; for there is every reason to believe that these employers sympathized to some extent with the workingmen, and that it was owing largely to their friendly support and encouragement that the Crispin organization attained to such power and wielded so much influence during the years 1868 and 1869; it was a power they might have continued to retain, to a great extent, had the wise counsels of some of their members prevailed in the lodge-room, and certain provisions of the constitution been altered or repealed; as it is now generally conceded, even by members of the order, that at that time some of their rules were arbitrary, and unjustly interfered with the rights of employers.

In the constitution for subordinate lodges which was adopted by the International Grand Lodge, April 23, 1869, and which was binding on the order everywhere, were some provisions which bore injuriously upon the rights of manufacturers, or, at all events, left their interests subject to the caprice of temporary majorities in the lodge-room.

The following is from a printed copy :—

"ARTICLE X.—NEW HELP.

"No member of this order shall teach, or aid in teaching, any part or parts of boot or shoe making, unless this lodge shall give permission by a three-fourths vote of those present and voting thereon, when such permission is first asked: *provided*, this article shall not be so construed as to prevent a father from teaching his own son; *provided*, also, that this article shall not be so construed as to hinder any member of this organization from learning any or all parts of the trade."

The following extract is taken from the constitution of the International Grand Lodge, adopted in Worcester, April, 1869 :—

"ARTICLE XIV.—GRIEVANCES.

"SECT. 1. Grievances shall consist of, *first*, being discharged for refusing to teach new help; *second*, being discharged for belonging to the Crispin organization; *third*, being discharged for being conspicuous in organizing new lodges of this order, or advocating its principles.

"SECT. 2. Whenever a grievance is supposed to exist in any lodge of this organization, notice shall be sent by the said lodge to the two nearest lodges of the order, whose duty it shall be, when notification is received, to appoint one delegate from each lodge, which delegates shall, in connection with one appointed from the lodge complaining, form an investigating committee.

"SECT. 3. It shall be the duty of said committee to listen to the evidence on both sides of the case, and endeavor to arrange the matter in dispute. If said matter cannot be arranged satisfactorily, it shall be referred to the State or Province Grand Lodge, which shall decide upon the matter, subject to appeal to the International Grand Lodge."

The committees appointed under section 2 of the preceding article, copied from the International Grand Lodge constitution, were regarded by Crispins as arbitration committees. Members of these committees declare that, in the settlement of all grievances, they were always willing not only to listen to the employers' side of the question, but took special pains to get that side of the case, even when employers refused to treat with them or in any way recognize their authority.

The following extract, taken from the special laws, will serve to show how grievances were brought before the lodge:—

"ARTICLE I.

"SECT. 1. It shall be the duty of members of the order employed by the same firm to organize by the choice of one of their number as director.

"SECT. 2. Whenever any cause for trouble or grievance is supposed to exist in a shop between the employer and members of the order, it shall be the duty of the director to ascertain the facts of the same, when, if the matter can not be adjusted satisfactorily to the parties interested, he shall, by majority vote of the workers on the part or parts in which the trouble occurs, refer the case to the lodge.

"ARTICLE II.

"SECT. 1. The director of each shop shall collect the dues of all members working in his shop, etc.

"SECT. 2. When a member working in a shop is six months in arrears for dues, the members in good standing shall demand that he become square on the books of his lodge, when, if he refuses, the director shall require of the foreman or employer the discharge of such delinquent; such request not being complied with, the director shall immediately refer the case to the lodge.

"ARTICLE III.

"SECT. 1. Every member taking a job in a new shop shall, upon entering, inquire for the director, and shall deliver up for inspection his paid-up card or director's receipt, and any member evading or refusing to comply with the provisions of this special law, the director shall proceed as laid down in article 2, section 2, of these special laws. All directors and members of the order are hereby instructed and empowered to attend to the rigid enforcement of this article."

Many of the most intelligent Crispins state that they always believed some of these rules to be unjust and arbitrary, and that the order, by their enforcement, was attempting to deal with matters not within its proper province; that they had often urged their repeal, giving it as their opinion, in the course of discussion in the lodge-room, where these matters came up, that employers were only submissive to such restrictions to save themselves from loss, and were determined to free themselves on the first opportunity from restraints under which they were every day becoming more and more restive.

Manufacturers of the smaller class, as we have before remarked, express themselves, for the most part, as having been favorable to the order on its first establishment. They think it might have been made a means of protection to their interests, as well as those of the workmen. But they say that, in the latter part of the year 1868 and during a portion of 1869, when the organization had almost full sway, the Crispins became exacting, presumptuous and insolent in their demands upon employers, often interfering with matters they did not understand, and which, at any rate, were not their concern; that, by the operation of the special laws, manufacturers were subject to loss and continual annoyance; that they could not discharge a man for any reason but he was almost sure to make complaint to his lodge, calling it a grievance and asking for a committee of arbitration; that there were many instances where they felt such committees had not treated manufacturers with even a shadow of justice; that it sometimes happened that an employer had reasons for his action, which he was not willing or even justified in unfolding to the committee; that, in all such cases, the committees were apt to be influenced by the most narrow views, and almost certain to decide against the employer; and that, even when the matter was fairly investigated and fairly reported to the lodge, it was always easy for a few demagogues or a small faction, by specious talk, to carry any vote they desired, sometimes ordering manufacturers to take men back into their employment whom they did not want, and sometimes to discharge men they needed and were anxious to keep, and who, on their part, were contented and willing to stay.

Manufacturers who are conducting a large business and employ many hands, express themselves as having always been opposed to Crispinism, and indignant at its claims. They have no objection to combinations of workingmen to keep up the rate of wages, in any fair and legitimate way; but, they say, "These men assumed to control our whole business. We claim the right to employ any who are willing to work for us, for as long as we please, and to discharge them when we please, without giving outsiders any reason." They further say that no disputes were ever properly settled by arbitration in the lodge-room or elsewhere; that in any disagreement with their own workmen, they felt that matters could have been much more easily arranged in the shop than by men outside, who could have little knowledge of the points at issue, and, perhaps, no regard for the various interests involved; that Crispin rule had been of great injury to the shoe business in Lynn; that, under its influence, the workman had given up his independence; he had ceased to make his own bargains, and might at any time be obliged to leave a profitable situation at the dictation of his lodge, and without respect to his interest or inclination; that, under the operation of Crispin interference, manufacturers had been afraid to make contracts or take heavy orders for goods, having no certainty that they could control their own business, and that, in consequence, many of the orders of 1869, which would otherwise have been filled in Lynn, were taken elsewhere; that at that time some of the large firms began to establish shoe-shops in other places. Factories were opened in Pittsfield, N. H., where the proprietors felt themselves safe from the effects of Crispin authority, and could command the advantages of cheap rents and cheap labor. In consequence, a large part of the work was done out of the city, which in other years had been retained there, for there was so much sharp competition among manufacturers, that each was on the watch continually to gain, if possible, any advantage over others; thus, though the workmen did receive more for their labor while at work, there was so much less work done in Lynn, that it is believed they really earned less money than they would have done had there been no organization. And they further state that during the year 1869, though there was no outbreak of a public nature, nor any mention of troubles by the press, yet the relations between the employers and the operatives were full of distrust and ill-feeling on both sides.

The records of the Crispin lodges seem to confirm the latter statement, as they show many cases of difficulty and trouble in the shops about that time. A manufacturer, at that time one of the largest in Lynn, states that he had but little trouble with his workmen on any occasion, and that most of the difficulties in which he became involved arose from his taking part with other firms; that during the year 1869 he had much more respect for the Crispins than for the employers, as the former held together and stood firmly to their rules, arbitrary and unjust though, in his opinion, they were; whereas manufacturers were so jealous of each other, that they could unite in nothing, but, on the contrary, were continually seeking to overreach or undermine each other. Further, he says Crispinism did not affect his business much, as he only manufactured first-class work, and always paid the very highest price for labor. But he was opposed to it from principle, and if he could have had other employers see as he did, it could never have gained such power in Lynn, and might at any time have been broken up by united action.

The following statement embodies the views and opinions of many of the leading shoe manufacturers of Lynn as gathered from time to time by personal interviews and conversations with them on this subject.

About the spring of 1870, many manufacturers finding it impossible to prosecute their business with any certainty of success, under the vexatious, unjust and arrogant demands of the Crispin organization, determined to endeavor by concert of action to find some means through which they might free themselves; in this they professed to be influenced not alone by motives of self-interest, but by a sincere regard for the best interests and welfare of their workmen. They saw very clearly that unless something was done, trade would leave the city, as no manufacturer felt safe in taking orders for goods, or entering into contracts with dealers in boots and shoes. While these matters were under consideration, and before any plans had been matured, one of the most prominent manufacturers in the city, without consultation, and almost entirely on his own responsibility, by means of one of his workmen, got himself invited into a meeting of one of the Crispin lodges, and there and then made a speech, in which he commended their organization and its principles.

Deploring the misunderstanding between employer and employé, he pledged his word, that if they would appoint a committee of five of their number, he would see that a like number of manufacturers were appointed to meet with them and talk over matters in an amicable manner; so that, if possible, some agreement might be reached which would be mutually satisfactory. In taking this unauthorized step, this gentleman was regarded by the other manufacturers as having betrayed their cause. His action excited considerable indignation among them, and the committee of five who finally met with the Crispin committee to arrange a scale of prices were self-appointed; but being all of them prominent men in the business, and large employers, their influence was such as to very much strengthen and encourage the Crispin organization. The manufacturers felt that their interests had been betrayed, and their attempted union broken up, yet they were obliged, as the best they could do under the circumstances, to adopt generally the scale of prices which had been agreed upon by the so-called committees. They were, however, none the less restive under the arrogant and arbitrary demands of the Crispins, and indignant that any employer of labor should acknowledge the right of an employé to interfere with his business.

In justice to this gentleman, it should be stated, that he felt the steps taken by him at that time were for the best interests of all concerned. He states that he has always tried to treat his workmen as equals, and has never been intentionally oppressive. The principle of arbitration inaugurated by him at that time, he believes to be just, and that it might be made an effectual means of settling all disputes, if both parties could only be prevailed upon to carry it out in good faith. He regards some union of workingmen as necessary for the protection of their own interests, and such union is, in many other respects, likely to be more or less advantageous to them; and though at that time there was much in the Crispin organization which he could by no means approve, it was his idea that it would have been better for the interests of the whole city if employers, by adopting a kind and forbearing policy towards the workingmen, could have established a better understanding of each others' interests; and when by mutual consultation and mutual concessions, confidence and good feeling should have obtained, it would not have been difficult to change or abolish the most objectionable provisions of the Crispin organization.

On the whole, this gentleman seems to entertain broad and comprehensive views of the subject, looking rather to the permanent welfare of the whole community, than to any individual interest. The ideas of the workingmen are various, but they may be summed up into three classes, as follows:—

The first class are those who do not believe in arbitration with employers, who have seen nothing but what is right in the most rigorous rules the Crispins ever adopted, and who would willingly have adopted those more stringent. The admission of a manufacturer into their lodge-room, as mentioned previously, was regarded by these members of the organization as a departure from the established principles of the Crispin order, and the acceptance of the doctrine of arbitration as a clear violation of its laws.

They argue that workingmen having their labor to sell ought to combine and fix among themselves what its price shall be. That if workingmen would only so unite, good wages could be maintained with certainty, employers would be obliged to agree to their demands, and as they would make their contracts for goods accordingly, it would be advantageous to the community as a whole. They say that arbitration between employer and employé always did and always will result to the advantage of the former and the disadvantage of the latter; and that, therefore, they regarded the establishment of such a principle in 1870 as a delusion and a snare; it was the entering wedge which first weakened and finally led to the complete overthrow of the Crispin organization.

A second class are of the opinion that a proper system of arbitration would do much to put an end to the disagreements between employers and operatives. That if such a board could be permanently established, composed of representative men from both parties, clothed with powers and supported by the general consent of those interested, strikes might be rendered impossible and the relations between employers and their workmen made mutually pleasant. But, they say, under existing circumstances, such a scheme is altogether impracticable.

Manufacturers generally are not sincere when they talk of justice to labor. It is their interest and object to get all the labor they can for as little pay as possible, and they will never give a cent more than they are obliged to. They do not generally believe in the right of workingmen to combine, but are continually arguing that the law of supply and demand regulates the rate of wages, and that it is their right as employers to hire labor in a free market for as low a price as possible. They claim that while employers hold such views, it is very evident they can not be induced to treat with workingmen on equal terms under any form of organization.

They further say that, in their opinion, the arrangements made in 1870 were only agreed to because employers could not help themselves, and that they were sure to be violated whenever interest demanded.

The third class of Crispins, though, perhaps, not the most numerous, hold about the same sentiments as those expressed by the manufacturer previously quoted. They state that they have been always more than ready to welcome any overtures from the manufacturers looking toward arbitration in the settlement of disputes or difficulties, and have been ready on all occasions to do their utmost to bring about friendly relations between employers and the Crispin organization. They concede that some of the Crispin laws were illiberal and unjust, placing improper restrictions upon both parties; restrictions which, from their very nature, could not be successfully maintained for any length of time. They specify in particular those laws relating to the hiring and discharge of help, against the enforcement of which they declare they often protested in the lodge-room, pronouncing interference in these matters one of the most fatal weaknesses of the Crispin order.

This class of men say they always have deplored strikes, and never gave consent to one, except as a last resort. When, therefore, arbitration was proposed by a leading manufacturer, the idea was hailed by them as a long step in the right direction, and they were ready to aid it by every means in their power. A mass meeting of the lodges was held, and, after some discussion, a committee of five was appointed to confer with a like number of manufacturers. On the 21st of July, 1870, these committees met in the Board of Trade rooms. There seems to have been no record kept of the transactions of this meeting, but members on the part of the Crispins state that it was anything but harmonious, and that more than once open rupture seemed imminent. One manufacturer made a speech, in the course of which he said that if any one had told him twenty-four hours before that he could have been persuaded to meet and treat with Crispins on any terms, he should have felt insulted. Through the exertions of a few more temperate minds, however, a better spirit finally prevailed, and, after much discussion, taking up two full days, a list of prices was agreed upon and adopted, to continue in force for one year. The two committees then exchanged congratulations. Speeches were made by some of the manufacturers, in which they commended the Crispin organization, and pledged themselves to rigidly adhere to the agreement made, and to use every proper means in their power to have it recognized and adopted in the trade throughout the city. After this united action, several strikes, which had previously been inaugurated, came at once to an end. The Crispins were jubilant, and considered they had gained a point in being recognized by employers as a body to be negotiated with on equal terms; and much confidence was expressed on all sides, that at length amicable relations had been permanently established between the manufacturers and workingmen of Lynn.

Notwithstanding the fault found with the doings of the self-appointed committee (so called), there is no doubt that for the time being, at all events, they were successful, and the list of prices agreed to by them was substantially that of the trade throughout the city for the next year.

It is charged, however, by the Crispins, that they could never again get that board of arbitration to meet with them; that in the settlement of difficulties which now and then arose from various causes in several of the shops, they received no aid or countenance from the employers, and that they had to assume the whole burden of enforcing the scale of prices, which, however, being printed, and headed, "List of Prices agreed upon between the Manufacturers and Knights of St. Crispin for one year from date," gave them a support in the arrangement of grievances they could not otherwise have had. Yet, still, it is evident that the Lynn shoe manufacturers generally considered that during this year there had been established some principle of arbitration to which they felt themselves, to a great extent at least, obliged to conform.

At the expiration of the time agreed upon, another committee of employers met with the Crispin committee of arbitration. They congratulated each other upon the success which had attended the fulfilment of the agreement just ended, the general peace and harmony which had prevailed and the prosperous condition of the city; after which a scale of prices was agreed to and adopted for another year, which was subsequently printed and circulated through all the shoe-shops in the city. It is worthy of notice, that, during these two years, when a fixed rate for labor had been established by this joint committee, the shoe business prospered, and the active and material growth of Lynn was the subject of frequent and flattering comment, not only in the local press, but throughout the country.

The statements made regarding the condition of affairs during the year of the second compact between the manufacturers and the workmen, ending June 10, 1872, are in some respects conflicting. While there was no noticeable outbreak, those acquainted with the inside history of that time state that distrust and bitter feelings began to be engendered as early as the fall of 1871; that though latent and smouldering, the fires of strife were then kindled which burst into flame the next summer, and thus brought about the disastrous strike of 1872. The records of the Crispin lodge show several complaints against manufacturers for cutting under the established prices in less than three months from the date of agreement, and the lodge records for the latter part of 1871 and the first part of 1872 show continual difficulties of that nature brought into the lodge-room. The Crispins say, that, in their efforts to adjust these difficulties, they received neither sympathy nor aid from employers; that though they repeatedly tried, they never could get a meeting with any board of arbitration on the part of employers; and that, finally, those manufacturers who had taken part in assisting to establish the scale of prices refused to be considered as belonging to a board of arbitration, were unwilling even to recognize the existence of any such board or principle and absolutely declined to discuss the subjects which had been considered with so much harmony and good feeling when the compact was made.

On the other hand, it is conceded that bitter and vindictive feelings crept into the lodge-room, and at times controlled the counsels of Crispins. The more intelligent and reasonable among them lost much of their influence, and there were some instances where temporary majorities, in meetings of the order, made decisions very clearly unjust, and against the interests and rights of employers. It is also conceded that in many respects Crispinism lost much of its former power over its members generally; they paid little regard to its rules, and were seemingly weary of the restraints imposed by the organization. It is said, however, that these troubles were but little known to the general public; that the Crispins, as an organization, adhered to the established price-list, and still struggled to maintain it throughout the city.

Manufacturers, on the other hand, charge that Crispinism had become perfectly unbearable; that the Crispins, elated with success and full of self-confidence, became every day more and more unreasonable in their demands; that they were continually trumping up fresh grievances and insisting upon conditions not only inconvenient to employers and injurious to their interests, but tending, if carried out, to drive trade from the city and ruin all concerned.

They further charge that certain of the Crispins had entered into secret contracts with some firms to work for less than the established prices, induced to do so by promise of steady work throughout the year, and that these very men were the loudest in insistence that the trade generally should conform to the established price-list. A few declare that the Crispin organization was at this time entirely in the hands of demagogues, who only used the order for their own selfish purposes.

Some of the most intelligent and reliable men who, in 1872, were leading and prominent members of the order, state that shortly before the termination of the second compact it was evident to them that certain manufacturers were determined if possible to prevent any further agreements of that nature; and that, in the spring of that year, they united with the resolute purpose of breaking up the Crispin organization.

They further say, that, while it must be admitted that there is some truth in the charges brought against the order, it is not the less true that employers never sincerely tried to make the best of it, but all along showed by their actions a spirit of opposition to it in any form; that if the committee of arbitration on the part of employers had even partially done as they promised, there would have been no trouble, as the workingmen were always more than willing to leave any grievance, real or supposed, to be settled upon that plan; that had employers generally shown such interest in the well-being of their employés, as they all of them professed to feel, any of the unreasonable rules or laws of the Crispin order could and would have been modified or abolished.

They express respect for the position taken by some who, from the very first, were the avowed and consistent opponents of the order, but were still too high-minded and honorable to take underhanded action against it.

But they allege that there were some employers so mean as to bribe certain of their men to divulge the secrets of the lodge-room and to act the part of traitors to the order; that many of the wrongs and much of the injustice with which the order was charged was instigated and brought about by these very men, acting under the instructions of their employers. They further point out, that the contentions about prices for labor have always been caused by a few of the manufacturers who, with selfish greed, were struggling to gain advantage over their neighbors; that the difference of two or three cents per pair on the price of the finished shoe is a difference the consumer will never feel, but that it is a matter of serious importance to the workman. They claim that employers should consider this fact first of all, in making contracts for goods with dealers. They finally allege, that, in the spring of 1872, when contracts with the dealers were made for the next season's work, there was such sharp competition among manufacturers, that they were taken at rates too low to afford the price for labor established by the board of arbitration, and that this, more than any other cause, led to the strike the next summer, and united employers to overthrow the Crispin organization.

About the middle of June, 1872, the following circular, signed by the Crispin committee, was sent to all the shoe-shops in the city:—

"*To the Boot and Shoe Manufacturers of Lynn.*

"GENTLEMEN:—We, the undersigned, a committee appointed by the Knights of St. Crispin, in mass convention assembled, respectfully notify you that we are prepared to meet with a similar committee of the shoe manufacturers of Lynn, with a view to arranging a list of prices for the coming year.

"Please inform us, through our secretary, of your action, at as early a date as convenient."

To this communication no reply was ever received. About the beginning of July, some of the large firms intimated their intention of reducing the price for setting edges one-half of a cent per pair, claiming that having introduced edge-setting machines the workmen could afford the reduction. This reduction they held necessary to enable them to compete with firms outside of the city.

The workmen replied that the edge-setting machine did not in the least facilitate their labor; that manufacturers were paying contentedly the higher price with or without machines, and urged that the contracts were taken on that basis; they finally invited their employers to appoint a committee to fix a scale of prices, in consultation with the Crispins, as in the preceding years. To this the employers rejoined, that for the future they intended to manage their business without consultation with any one; the price offered was all they could or would pay, and the workmen must either take that or leave. Of course this condition of things speedily became a subject of discussion in the Crispin lodges. They held mass meetings, some of which were full of intense excitement and lasted all night. New members joined, and old members in arrears came flocking forward to pay their dues.

Resolutions were passed declaring their firm determination to adhere to the principles of the order. Finally, committees were appointed to wait upon the manufacturers, and endeavor to bring about a settlement of the difficulties. Members of those committees state that when, in the performance of the duty assigned them, they approached the same parties by whom they had been so courteously received on previous occasions, and with whom they had arranged the scale of prices for the preceding year, they were met by contempt and ordered to leave the premises; so that those who before had shown a most kindly feeling toward their society, were then unwilling to recognize its existence.

These facts being reported to the lodges, a mass meeting was called, at which it was ordered that the men in such of the shops as were cutting under the established prices be requested to finish what work they had in hand, and then at once leave the shop. In accordance with this action, the hands in thirty-five shops stopped work, and it became evident that the relations of capital and labor in Lynn were to go through a serious crisis. At the first, however, the other shops in the city kept steadily at work, some of the employers freely saying that they could see no particular reason for the reduction, and therefore they should continue to pay the old prices.

It is believed, that had this dispute about prices been the real question at issue, and had it been left to be decided upon its merits, the Crispins would have gained their point. It very soon became evident, however, that this was only the first move,—a mere out-post in the battle,—the real object of which was to be the utter and complete overthrow of the Crispin organization in Lynn. For with this object openly avowed, the manufacturers commenced to organize, funds were raised, and agents sent to the several employers to enlist their aid and sympathy in the movement.

The following is an extract from the "Lynn Reporter," August 10, 1872:—

"On the 2d of August, a meeting of the shoe manufacturers was held, at which were present about fifty of those most prominent in the business. At this meeting, the opinion was generally expressed that the state of things as had for some time past existed in Lynn could not continue without serious injury to the business of the city. It was stated that some of the manufacturers had already established flourishing factories in distant towns, where labor was untrammelled and consequently cheaper than in Lynn, and that others were making arrangements for an early removal. It seemed to be the unanimous feeling that something should be done to check this emigration of business, and the first step towards that end must be in each manufacturer maintaining the same control of his business, especially in regard to the payment of wages, that is enjoyed by the manufacturers in other places, thus enabling the Lynn manufacturers to successfully compete with those in other places. . . . It was then unanimously resolved, 'That it is for the best interests of the city of Lynn, that every manufacturer manage his own business irrespective of any organization.' "

After the passage of this resolution condemning organizations of workingmen, the manufacturers proceeded to organize under the following agreement:—

> "We, the undersigned manufacturers of the city of Lynn, hereby agree that on and after Saturday, August 10, 1872, we will employ no person subject to, or under the control of, any organization claiming the power to interfere with any contract between employer and employé."

A committee was appointed to circulate the above through the city, and it was subsequently printed with fifty names appended.

At a subsequent meeting of manufacturers, held in Music Hall, August 8, it was unanimously—

> "*Resolved*, That we notify our workmen that after Saturday, August 10, we will give no new work to any person subject to, or under the control of, any organization claiming the power to interfere with any contract between employer and employé."

The result of this action was that more than 2,000 workmen gave up their situations rather than leave the Crispin organization.

At a mass meeting of the Crispins, held soon after, the following preamble and resolutions were adopted:—

> "*Whereas*, There is a disposition on the part of certain manufacturers in the city of Lynn to dictate unjust, illiberal, and, to use a mild phrase, tyrannical terms to those in their employ; and
>
> "*Whereas*, Our acceptance of such terms could only be made by a complete sacrifice of self-respect and personal independence; therefore, be it

"*Resolved*, By the Crispins of Lynn, in mass meeting assembled, that while we recognize the right of manufacturers to offer such terms as justice and regard for their own interests may require, we also assert and maintain, at every cost and every hazard, our right to belong to, and participate in, any organization, social, industrial, religious, political or beneficiary, which in our judgment is wise and proper; and any attempt on the part of any one to abridge or obstruct such right is a vile and indefensible interference with personal liberty."

Thus the Crispins joined issue in a struggle which they felt was to be for the life of their organization, and they clearly saw that the manufacturers were bound together as they never had been previously. The employés in a certain shop were all Crispins; there had been no trouble there, as Crispin prices were paid; but this firm had signed the agreement of the manufacturers not to employ Crispins after August 10, and on that day the senior partner called his men together and told them they must either abandon the Crispin organization or cease to be employed by him. "You can go," he said, "or you can remain. I do not ask you to work at any reduction of wages, for I am ready to pay the very highest prices; but if you remain, you must cease to be Crispins, for no member of that order shall occupy a bench here after to-day." They were given a day to think of it; but in fifteen minutes they reported that rather than submit to such unjust and arbitrary interference with their personal liberty and rights as freemen, they would leave, and they therefore all left at once.

In another shop, the following letter was read to the workmen by one of the firm, in connection with the agreement signed by them:—

"In submitting the proposition herewith placed before our employés, we desire to state the following facts:

"*First.* That in assuming the position taken in the accompanying resolution, manufacturers of the city of Lynn, representing at least three-fourths of the shoe manufacturing business of this city, have acted from a conviction reached after the most careful and deliberate thought, that upon no other basis can this business be successfully prosecuted.

"*Second.* That in taking this position as a body, we have fully counted the cost, and feel that we are united, as never before, in solemn agreement to abide the result of this action, at whatever sacrifice to our business and to our capital.

"*Third.* That the question of wages has in no manner entered into our counsels, but that this question is left open to the unembarrassed action of employer and employé.

"*Fourth.* That we, as a firm, have had, and still have, no desire to change our prices for work during the present season.

"*Fifth.* That it is the earnest desire of this firm to conduct its business in such a manner that the annual earnings of our employés may reach the largest possible amount; and we submit the fact that our books show that this result was much more fully attained during the years when we were left free to arrange prices with our workmen to our mutual satisfaction, than it has been during the two years just passed, when subject to outside dictation.

"*Sixth.* That while this firm will in no case recede from the position now taken, whether supported by others or not, we would express the sincere desire that, whatever may be the issue in the question now before us, no action will be taken upon either side in a spirit which will tend to destroy the feelings of friendship and respect which we believe now mutually prevail between us.

"Signed,

"LYNN, August 9, 1872."

The alternative of withdrawing from the Knights of St. Crispin or giving up their situations being thus placed before the workmen, they one and all preferred the latter and left the shop. These examples were quickly followed in other shops; very soon the city swarmed with idlers, and the Crispin committees found a most difficult task upon their hands. By article fifth of the general laws, every one of these unemployed men was entitled to draw from the funds of the order: for a single man, six dollars per week; for a man with a family, six for himself, two for a wife or mother dependent upon him, and one for each child under twelve years of age. As no ordinary treasury could long endure such a drain upon its resources, the Crispins soon began to realize that the situation was grave in the extreme, and that their prospects of success were every day becoming more and more doubtful. Notwithstanding the great excitement, and though various rumors were daily floating through the city, it was never alleged that any sort of coercion was threatened against those of the trade who did not belong to the order. Indeed, it was the subject of much comment in newspapers which in other respects did them less than justice, that the workingmen were worthy of praise for the quiet and peaceable manner in which they conducted themselves throughout the whole of the troubles.

August 17th, the Crispin committee of arbitration held an all night session, during which the situation was discussed in all its aspects, and the result of their deliberations was a determination to make an attempt to effect a reconciliation. A committee was appointed which, the next Monday forenoon, waited upon many of the leading manufacturers who had signed the agreement of August 8th and made to them the following proposition, upon the adoption of which the committee guaranteed that the men would return to their work: *Firstly*, That the question be not raised by the employers whether or not the men belonged to the Crispin organization, which order should continue to exist as heretofore. And, *secondly*, that the list of prices be abolished, and that each firm make its own contracts and arrange its own prices with its own workmen, irrespective of any other firm and without interference by the Crispin organization. It was confidently expected that this action would impress the manufacturers favorably and that they would consent upon these terms to resume business.

But when waited upon by the above-mentioned committee, they one and all refused to receive any proposition from Crispins, taking the ground that having agreed to give no employment for the future to any men subject to the control of such organization, they felt bound not to acknowledge its existence.

At a mass meeting of the Crispins, held next forenoon, the board of arbitration reported the failure of their efforts at reconciliation; and when it became known that the ultimatum of the manufacturers was an entire and final renunciation of Crispinism on the part of the workmen before any proposition of settlement would be entertained, there was considerable excitement, speeches were made and resolutions passed by a unanimous vote and amidst much enthusiasm, pledging unwavering fidelity to the order. Notwithstanding this last display of spirit, it soon became evident that the Crispin organization was fast becoming weaker; that its power of resistance was gone and its unity broken up.

Manufacturers commenced work with what help they could get, either in Lynn or in other places. Some firms sent their stock to Portland, Newburyport and other towns to be made up; other firms set men to work under what they called a special agreement; which was that, though they belonged to the Crispin organization, there was an express understanding that this fact should have nothing to do with any of their relations to their employers. The board of arbitration having remonstrated against such arrangements as a violation of the rules of the Crispin order, the workmen in one case published a card in the newspapers to the effect that they were not at work under the force of the manufacturers' resolution, but that they still regarded themselves subject to the orders of the Knights of St. Crispin. For this action, these men were at once discharged from their employment and ordered to leave the establishment. They soon afterwards, however, published another card retracting their former statement, and were again set to work in their old places.

By this time, the Crispin board of arbitration began to feel itself-powerless; the treasury was exhausted, two thousand members of the order were without employment and mostly without means of living. Manufacturers were offering work and the highest prices to all who would consent to renounce fealty to the Knights of St. Crispin. It is not surprising therefore, that one shop's crew after another met together and, coming to the conclusion that any further struggle was hopeless, voted to go to work on the best terms they could get. By the 24th of August the strike was virtually at an end, and though lodge-meetings were still held by an indomitable few, the Crispin organization, in spite of their efforts, finally fell entirely to pieces in Lynn. About the beginning of 1873 the last charter was surrendered to the International Grand Lodge. During the next two years there was, as is well known, a general depression in all kinds of business, and the shoe trade came in for its share. There was little demand for goods, the sales being chiefly of the cheaper grades.

Manufacturers were in sharp competition with each other for orders, and workingmen, without organization and at their mercy. Prices for labor in nearly all departments of the business went down until, it is said, a good workman, laboring hard ten or twelve hours a day, could not earn more than eight or nine dollars a week. To understand the full force of this statement, it is necessary to remember that at the best of times the busy seasons are brief, and that there are always many months in the year when there is but little chance of employment.

Manufacturers themselves admitted that the prices for labor were too low, and confessed that they could not understand how men with families to support, managed to do so, even when they had constant work. Some of them even began to admit that the Crispin organization, with all its faults, contained some good features, and that some association of workingmen was necessary, not only for their own protection, but for certain advantages to employers.

With considerable countenance and aid, therefore, from some of the manufacturers, the workingmen again organized, under the name of the Shoemakers' League. One of the main features of this organization was the establishment of a board of arbitration. This was about the beginning of 1875, and though they held meetings more or less regularly, there is no evidence that they ever exercised much influence, and as the members hardly numbered three hundred at the most, the League could never claim properly to represent the general interests of the Lynn workingmen. Therefore, after about an eleven-month struggle to maintain an existence, on the seventh day of December, 1875, by unanimous vote, the League dissolved, and the members organized as Unity Lodge, K. O. S. C., adopting the ritual of the order and receiving from the International Grand Lodge the charter which was surrendered in 1873. Unity Lodge now numbers nearly three thousand members, and since its organization has sent delegates into twenty-eight towns and instituted thirty-one new lodges, as follows:—

West Boylston, Milford, Haverhill, Marblehead, Worcester, Spencer, Stoneham, Hopkinton, Medway Village, West Medway, Rockland, Stoughton, Randolph, Methuen, Newburyport, Millbury, Beverly, Salem, Marlborough, Natick, Cochituate, Quincy, Weymouth, Tapleyville, Holbrook, Webster, Brockton and North Brookfield in Massachusetts, and Pittsfield in New Hampshire. All these are represented to be in a prosperous condition. The most objectionable features of the old order have been done away with. No claim is made to any right of interference with employers in the hiring and discharge of help, nor in the teaching of new help any part or parts of the trade. No strike can be ordered, sustained or allowed except by vote of the board of arbitration and the unanimous consent of the shop's crew where such strike takes place.

The board of arbitration is composed of eleven members, each from a different branch of labor, as follows: a cutter, stock-fitter, laster, McKay stitcher, beater-out, trimmer and edge-setter, hand nailer and shaver, Tapley heel burnisher, McKay nailer and shaver, bottom finisher, channeller.

They are elected to office for a year, and chosen, not alone for their integrity and general intelligence, but also because they are regarded as superior workmen, each being an expert in his branch of the business.

To this board are committed all the active powers of the lodge. The following is an extract from the by-laws:—

"ARTICLE X.—ARBITRATION.

"SECT. 2. At the first meeting of the board, they shall organize, by electing a president, secretary and treasurer. It shall be the duty of the president to convene the board, on the written application of any five members of the lodge working in a shop, or on application of a manufacturer who has cause to think he is aggrieved. The secretary shall keep a true and correct record of the proceedings of all meetings of the board, and of all subjects referred to them for decision, and shall report the doings of the board to the lodge, at the first meeting in every month.

"SECT. 4. The board shall have power to settle all difficulties that may arise between any member or members of the lodge and their employers, by arbitration; and it shall be the duty of the board, when such case has been referred to them, to carefully examine all the circumstances connected with it and endeavor to effect a settlement by arbitration, before giving their consent to a strike. It will not be the duty of the board to give aid or encouragement to a strike, begun without their consent, by any members of the order.

"SECT. 5. When any matter has been referred to the board for arbitration, it shall be their duty to appoint a committee from the board, who shall meet a committee appointed by the employer.

"If the committees agree upon any plan of settlement, any decision they may make shall be final. An appeal may be made to the lodge from all decisions made by the board, except in cases referred to them for arbitration. This section shall never be repealed.

"SECT. 6. The board shall meet once in two weeks, or oftener if necessary, and shall require at all times a majority of its members to transact business.

"SECT. 7. The board shall have power to call a special meeting of the lodge at any time they may deem it necessary."

In the thirteen months that have elapsed since its organization, this board has settled about one hundred cases of difficulty in different shops, most of them amicably and without much trouble. Nearly all of them arose from attempts on the part of employers to cut under what was considered a fair price, and as the chief object of the board is to establish and maintain, as nearly as possible, a uniform price for labor in all branches and grades of work in shoemaking, many of the manufacturers look upon the plan with favor, and they extend to it a certain moral support, though as yet they have appointed no committee to act in conjunction with the Crispin board. Still the smaller employers especially regard its establishment as useful and efficient in preventing ruinous competition in the business.

The following cases illustrate sufficiently the various work of the board:—

A reduction in the prices paid for trimming and edge-setting was proposed by a certain firm. This was resisted by the workmen, who made complaint to the board of arbitration. It was claimed by the firm, in reply to questions put by the committee, that they had at considerable expense introduced edge-setting machines, which materially lessened the labor, and their use would enable the men to earn as much pay notwithstanding the proposed reduction of price. On the other hand it was stated by the men, that the machines were of little or no service in the way of saving labor or facilitating the work.

After a full investigation, the board arranged the prices for work with edge-setting machines in this shop, as follows: $1.65 for first, $1.50 for second and $1.25 for third quality. This arrangement, which was satisfactory to both parties, was considered to be a settlement of the difficulty without a reduction.

Complaint was made to the board that certain channellers had been discharged from a shop for the reason that they had been active in inducing what is termed a boss channeller—that is, one who underlets part of the work taken out by him—to give up that position. On the report of a committee appointed to investigate, the board were of opinion that the men had been discharged without reasonable cause, and they therefore informed the manufacturer that no Crispins would be allowed to take their places. The result was, that the men who had been discharged were reinstated.

In another shop a general reduction of prices was proposed, which being resisted by the men, the subject came before the board, who appointed a committee to wait upon the employers, directing the men in the meantime to continue work as usual. After due investigation the board sustained the men in their resistance. The firm retreated from their position and continued to pay former prices.

The channellers in another shop complained to the board that they were receiving less for their work than established rates, and that they had requested an advance, which was refused. A committee from the board waited upon the proprietor, found the facts to be as stated and finally induced him to concede the demand of his workmen.

A certain firm proposed to reduce the prices paid for trimming, edge-setting, nailing and shaving. The reduction was resisted by the men, and two of those most prominent in opposition were discharged. The board of arbitration sustained the operatives and, after several meetings with their employers, finally induced them to continue to pay old prices and also to reinstate the men who had been discharged.

Another firm proposed to make a general reduction on certain kinds of work, and the matter came before the board for adjudication. After considerable discussion the board prepared a list of prices for the shop, which the firm consented to adopt for the season.

A shoemaker complained to the board that he had been discharged from his shop without valid reason. The committee of investigation reported that he was discharged for making an assault on the foreman of the shop. The action of the proprietor was sustained by the board and the complaint dismissed.

A difficulty arose in a shop with regard to the price to be paid for machine lasting. On investigating this case the board held that lasting machines were of no advantage to the operator, there being no saving of time or labor by their use; that therefore the prices should be fixed at the same rates as were paid for hand lasting. This was finally agreed to by the proprietor, who also, at the suggestion of the board, consented to employ his hand lasters to work such lasting machines as he should decide to use.

In the same shop a McKay machine operator, who had been discharged for seeking an advance of price, was reinstated in his position by the exertions of the board, and the advance secured to him.

The lasters, trimmers, edge-setters and buffers in a shop, believing that they were working for lower prices than were paid elsewhere for similar work, demanded an advance. On investigation the board sustained them in their demand, and eventually succeeded in securing for them the prices paid in other shops for the same grade of work.

A certain firm had a shop in Lynn and also one in another State. The hands in the latter struck work when a reduction of prices was proposed to them, and complaint was subsequently made to the board of arbitration in Lynn that the firm was having certain parts of its work done in their Lynn shop and afterwards sent to their shop out of the State to be completed. The board on investigating the case came to the conclusion that it was beyond their province to interfere with prices paid in other places, but determined to insist that all work done in Lynn should be paid for at the established rates. The firm finally closed the shop in which the difficulty arose and now manufacture all their goods in Lynn and pay the established prices.

Complaint was made by a man, on account of his discharge from a shop, another man being put in his place. In this case the complaint was dismissed, as it was found on investigation that the proprietor had good ground for his action.

The men in a certain shop complained that a reduction had been made in their pay. The board succeeded in settling the case amicably by securing an advance on some kinds of work and allowing a reduction on others.

In another case the men in one of the departments of a shop demanded an advance which the proprietor refused to pay; finally the men struck work and left the shop in a body. This action coming to the knowledge of the board of arbitration, they informed the operatives that unless they resumed work at once their places would be filled by others, as it was a flagrant violation of the laws of the order, for any shop's crew to inaugurate a strike without authority from the board of arbitration. In accordance with these instructions, the men quietly returned to their places and no further complaint was made.

The three-handed teams in another shop demanded an advance. The proprietor appeared before the board and explained his position, stating his entire willingness to pay regular prices. Subsequently, in consultation with a committee from the board, an advance for some parts of the work was made, and the trouble was amicably settled.

In another shop, the lasters demanded an advance. The matter was referred to the board, who sustained the men in their demand, and the firm finally agreed to it.

In another case the board sustained the lasters in resisting a proposed reduction, and the firm yielded and continued to pay regular prices.

The McKay stitchers in a certain shop complained of a proposed reduction of their pay on a certain grade of work. The board investigated, and concluded that the men should be sustained. This decision being reported to the proprietor, he receded from his position and continued to pay the former price.

A man complained to the board that he had been discharged from employment on account of his connection with the order of St. Crispin. The case was investigated and dismissed, it being found that his late employer had other and sufficient reasons for his action.

The McKay nailers in a certain shop demanded an advance of price, which the proprietor refused to pay. On the case being investigated by the board, the latter was sustained and the men ordered to continue work at the same rates.

Two firms complained to the board that they had reason to believe they were paying higher prices for some branches of work than was paid by a certain other manufacturer, and requested the board to investigate. The board appointed a committee to ascertain the facts; finding these to be as stated, they reported accordingly. A new list of prices was then drawn up, and the board of arbitration, in consultation with the three firms mentioned, settled the difficulty harmoniously by adopting a scale of prices as nearly as possible in accordance with that paid in other shops for similar work.

Complaint was made to the board by a manufacturer that he had reason to believe that the men in a certain shop were working at reduced prices, and the board was desired to inquire into the case. A committee from the board, accordingly, waited upon the proprietor of the shop mentioned; they subsequently reported the facts to be as alleged, and that the said proprietor stated to them, in justification, that he was manufacturing goods in advance of orders and could not afford to pay full prices under such circumstances; moreover, that the men working for him otherwise would be without employment. The board held that the general welfare was paramount to any individual interests; that, if a reduction in prices were to be allowed under the plea that goods were being manufactured in advance of the market, it would establish a bad precedent. They therefore informed the manufacturer in question that, as others of his class depended upon the board of arbitration to maintain an established scale of prices, he must either consent to pay regular rates, or the board would order the men to leave his shop. The result was that he gave up making goods in advance of orders, and a number of his hands were discharged.

In another shop the proprietor informed his men that he intended to make a general reduction of prices on all parts and grades of work, and that for the future he proposed to make his own bargains with his men without the interference of the board of arbitration or any other outside parties. This action was opposed by the workmen, and complaint was made to the board of arbitration. A committee from the board waited upon the manufacturer, but they utterly failed to move him from his position. The board, after several meetings and various efforts to compromise the difficulty, finally gave the men leave to strike when they had finished such work as they had in hand. Accordingly, each man, as he finished his job, took his tools and left the shop. Considerable ill-feeling was engendered in this case. Placards from the manufacturer were posted throughout the city calling for workmen, to whom the highest prices were promised. Immediately under these might be seen a card from the board of arbitration notifying all shoemakers that the hands of this manufacturer were out on strike to resist a reduction of pay, and warning all Crispins to keep away from the shop. This condition of things continued about two weeks, when the board of arbitration effected a compromise by allowing a reduction for some parts of the work and securing an advance on others. The men then returned to their work.

A manufacturer gave notice that he intended to make a cheap grade of shoes. The board sent a list of prices to him for such shoes as he proposed to make. He was informed, however, that he would be expected to allow the old prices for his other work. He adopted the list and agreed to the conditions demanded by the board.

The cases which we have given sufficiently exemplify the work the board has to do. They illustrate most of the difficulties which they are called upon to arbitrate. For the last six months the duties of the board have been almost continuous and very often arduous and difficult, involving the exercise of considerable prudence and patience. Meetings have been held as often as required; generally at least twice a week. For attending evening meetings the members receive no compensation; but when they are obliged to spend time during working hours, they are allowed thirty cents per hour for the time actually spent in the performance of their duties.

There seems no present prospect of the establishment of a board of arbitration on the part of manufacturers, to act in conjunction with that of the Crispins. The most obvious difficulties in the way arise from the nature of the shoe business, subject as it is to continual fluctuations, consisting, as is well known, of short, busy seasons, when every nerve is strained to fill the orders with the utmost possible despatch, as they pour in from all sections of the country, and soon succeeded, as trade begins to fall off, by lulls, during which there is little business in any department. This leads to an intense and feverish competition among manufacturers, precluding any real unity of action except when it is forced upon them by outside circumstances. Not the less, however, has the work done by the board of arbitration shown the value of the principle; nor is it easy to estimate the extent of its services in allaying ill-feeling and preventing strife. It would be absurd to suppose that any body of men could discharge such duties as that of the board of arbitration and escape criticism. However, the moderation, firmness and fairness which the members of this board have brought to bear upon the various cases referred to them for adjudication, have prevented many strikes, and secured for their decisions the respect and confidence of their fellow-workmen, and to a great extent also that of the manufacturers.

As at present constituted, it is composed of men of more than average ability, each of whom has a thorough and practical knowledge of some of the branches of the shoe trade; they are therefore able to consider intelligently the various questions referred to them, while the feeling of immediate responsibility under which they rest is a guarantee that their deliberations will be conducted with coolness and caution.

PART II.

CO-OPERATION IN MASSACHUSETTS.

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The prominent position in social science which the system of co-operation, especially in the distribution of goods, at times assumes, demands of this Bureau the record of all that may throw any light upon the subject or assist in making the efforts of the future more intelligible. There have been in this State since 1840 various attempts to embody the principle, and with varying success. This Bureau, in 1871 and again in 1875, devoted considerable space to its consideration, but no connected history of the efforts has been made; and with a desire to secure the facts, before men now living, who alone could give them, should pass away, we attempted, through Mr. George E. McNeill of Cambridge, a compilation of the records of different societies and the collation of evidence of their officers. Mr. McNeill attended to this duty, and has furnished the following:—

Thorold Rogers, who fills the chair of political economy in the University of Oxford, England, says, "Co-operation, rightly understood, is the harmony of those divergent interests which are represented under the terms capital and labor." To reach this harmony has been and is the struggle of civilization.

Massachusetts, from her earliest settlement, ingrafted into her theory, practice and law the fundamental principles of co-operative control. Her chief corner-stone is laid upon the enduring basis of equality, equity and unity,—equality of right, equity of dealing, unity of purpose.

equity of dealing; a unity the result of necessity, as well as of habit, custom and motive, and all were welded by a general intelligence.

The adoption of this system by the heterogeneous States was a leap the hazard of which we have never realized, and the result of which it is too early to predict.

In our own State, emigration has destroyed the homogeneous barrier to monarchical forms and systems. Neighborliness often disappears when neighbors have neither religion, habits nor tastes in common. Co-operation is the agreement with disagreeable people for a stated object. The Pilgrim might have so agreed; the Puritan and his descendant, never. They agreed to conquer, never to submit. But not alone the emigrant had broken down the walls of the Pilgrim's Zion. The moral barrier had already given way in the union of the township with the plantation,—a compromise between the share fisherman and the no-share slave that lead 'to further compromise.

The share and chattel system wedded, strengthened the wage system,—a compromise with equity. Equality and equity thus surrendered, unity was the next and only barrier to the overthrow of co-operative government. Eighteen hundred and thirty-two witnessed the first attempt in the nullification doctrine of South Carolina. Eighteen hundred and sixty, the second, from the same monarchical source. The whole moral power of the wage-labor States was forced into defence of the first principles of republican institutions,—equality of right and unity of purpose. With reconstruction fairly settled, the experiment of co-operatively governed States rests upon the two pillars, equality under the law, and unity to protect the law.

Equitable legislation in this State has been, save in one instance, purely palliative. The excellent paternal and administrative legislation that cares for the insane, idiotic, inebriate, the blind, deaf, dumb and the pauper, that acts as ward for the orphan, that protects the dumb beast, that regulates and reduces the hours of labor of women and children, and attempts to give educational advantages and opportunities to all,—these are the products, not of the co-operative principles of the

Mayflower and the Declaration of Independence, but of the broad humanity of which they are the expression.

The exception is the system of insurance, which is, if rightly conducted, co-operative, neighborly, equitable. The school-house and the town-house remain as the outward bulwarks against the inroads of any encroaching monarchical tendency. Unseen barriers also remain in the habits of thought that establish the standard of living; in the traditions of the fathers; the sobriety, thrift, prudence and intelligence of the people. Lloyd Jones says, "The cure for the evils of co-operation is more co-operation." The only way to hold on is to go forward. True conservatism advances. Co-operation is held on to by past, not present, strength. The grasp will lessen unless younger vigor comes to our relief. While we are rejoicing at the impetus given by the abolition of slavery, the momentum of our past mistakes is not yet exhausted. The political power of the citizen is lessening, both by the annexation of city to city, increase of population without increase of representation, larger patronage to rulers, attempts at less frequent elections, increase of the terms of office in municipalities, biennial sessions of the Legislature, decrease of elective officers, etc.

Industrially, productive and distributive agencies are stimulated to excess, while the power of the citizen to consume has not increased in the same ratio. Capital at one time indulges in the excitement of speculative schemes, at another falls into the stupor of exhausted energies.

Socially, class distinctions have increased. Wealth is aggregated and protected. Poverty is congregated and demands protection. Two classes, permanent and antagonistic: the laborer, poor and ignorant; the capitalist, rich and cultured. On the side of the first are numbers and brute force; on the side of the second, cunning and power. Singly, each class is self-destructive; unitedly, they are constructive. Such is the bane. What is the antidote? No one contends that there is too much wealth. All agree that there is too much poverty. Co-operators have attempted the task of "letting distribution undo excess"; and though the plan is simple, the work is difficult.

The first attempts at the new phase of co-operation—its use in trade—which it has been possible to discover in the brief time allotted for this investigation, were made somewhere between 1830 and 1845,—a seedtime for all such enterprises. The infant steam-power was unsettling past methods and inaugurating new. The productive fever was presaging the incoming of the producers' famine. Machinery, iron-handed, stomachless and brainless, added to the doctrine of Malthus the amendment, that the development of machinery, and not the development of man, was the demand of civilization.

In this country and in England, as well as on the Continent, the minds of many thinking men had been aroused to the importance of a solution of the growing problem, how to adjust the relations of capital and labor. In France, Fourier; in England, Owen; in America, Josiah Warren,—each one proposing a social revolution by different methods. Fourier's was the best accepted dogma with Americans, though Owen found many followers. Josiah Warren had, before this, in 1826, formulated the theory, "That cost was the limit of price," and was at this time attempting to prove it by running a store on that principle, charging only for the time taken in each transaction, under which, as Holyoake says, "A paper of needles might cost as much to sell as a barrel of flour."

Conventions of different associations were of frequent occurrence. The New England Association of Farmers and Mechanics, which held its first convention at the State House in February, 1831, was the first to introduce and discuss resolutions upon the subject of co-operative trading. No action was taken, neither was the subject ingrafted into the ten points of the platform submitted by the committee. The committee appointed to consider the question were unable to agree. One report recommended action, and the other consideration. No further record of co-operative agitation is at hand until 1845, though it must have been a subject of discussion in the numerous labor organizations of the day, holding meetings and conventions monthly and quarterly.

Of the stores prior to 1845, we have no data. The most that can be learned of them, is, that goods were bought in bulk and retailed at a margin above cost to pay expenses; that the managers were unpaid and unthanked, generally cursed, and always tired out; that when the few zealous members withdrew, the store either went into private hands or closed up.

The community experiments of the Transcendentalists at Brook Farm, and of the Christians at Hopedale, were attempts at co-operation, and were the results of the preceding agitation. At that time men of the highest culture joined hands with the uncultured; Dana, Greeley, Channing and the factory men and women speaking from the same platform, serving on the same committee,—all earnestly engaged in the same movement.

New England Protective Union.

In 1845, after considerable discussion, a store was started in Boston, the first purchases of which were a box of soap and a half-chest of tea; from which small beginning, grew an enterprise that in its best days traded from one to two million dollars annually. This effort was called the "Workingmen's Protective Union." Like all other co-operative movements, it grew out of the agitation of the labor question.

At the convention of the New England Workingmen's Association, held in Fall River, September 11, 1845, the following resolutions were introduced and laid over until the next session:—

"*Resolved*, That there is little and most uncertain power in the present grasping, selfish and monopolizing institutions of society, to develop the virtues, secure the rights, or promote the happiness of the people; that, on the contrary, while the social and political institutions remain as they are, there is an absolute certainty of a constant and rapid increase of vice, oppression and misery destined for them to suffer.

"*Resolved*, That the first inherent rights of man is the right of paternal protection, and that the relation of the parent to the child is the antetype of the true relation that exists between the government and the individual; and that this relation ought to be acknowledged and practically adopted as the basis of all law and government.

"*Resolved*, That, in the judgment of this convention, a resort to the polls is the only practical and effectual measure which the workingmen can at present adopt for the defence of their rights.

"*Whereas*, All means of reform heretofore offered by the friends of social reform have failed to unite the producing classes, much less attract their attention; therefore,—

"*Resolved*, That protective charity and concert of action in the purchase of the necessaries of life are the only means to the end to obtain that union which will end in their amelioration."

The first division of the New England Protective Union, then known as the Workingmen's Protective Union, was organized in Boston, October 8, 1845, with Horace Seaver for president; C. C. Jones, recording secretary; Henry P. Trask, corresponding secretary; J. G. Kaulback, Jr., treasurer.

These gentlemen had been prominent in the workingmen's associations and labor-reform agitations of the preceding years. As will be seen in the following preamble to their constitution, their purpose was broader than the mere distribution of goods at cost. They said:—

"*Whereas*, There are many of our fellow-workingmen who have so small an equivalent returned them for their toil,—although laboring excessively, to the deterioration of health as well as to the neglect of the intellect,—that in very many cases no surplus remains after the purchase of the necessaries of life: hence indigence; and in the event of sickness, they are not only destitute, but are without that kindness and sympathetic attention to which their case lays claim.

"*Whereas*, Many evils arise from the isolated way in which the laborer, as a man of small means, has to purchase the necessaries of life; therefore, to unite the little fund of the producers, and purchase in season, as do the wealthy class their fuel and groceries, would, it is obvious, secure to them a larger share of their products than they otherwise could; and—

"*Whereas*, We most firmly believe it is the imperative duty we owe one another and ourselves to give all the information in our power to the procurance of sure, steady, and profitable employment, that we may have deeds of genuine sympathy, which not only manifest themselves in relieving the destitute, administering to the sick, but those which strike at the root of poverty; such as will secure good pay and fewer hours of labor, and thereby in no ordinary degree remove the cause of poverty and sickness.

"*Therefore*, for the better securing of these principles and the obviation of the forementioned ills, we resolve ourselves into an association, and agree to be governed by the following rules and regulations."

This preamble and constitution was printed in full in the "Voice of Industry," the organ of the Workingmen's Association, a paper published in Lowell, and edited by W. F. Young, afterwards secretary of the central division of the union, and from whom many of the facts here given were obtained. In the editorial of the same number, we find this indorsement:—

"By a perusal of this constitution, it will be seen to agree, in all the fundamental principles and objects, with the one recommended and adopted by the National Industrial Convention at New York; and we sincerely hope and trust this union of sentiment and feeling between the New England, Middle and Western States will result in a general organization of the friends of *free labor* throughout the country.

"The objects proposed by this plan are of vital importance to the future prosperity of the working men and women of our land, and the universal good of mankind; for the many sad lessons of the past are ample testimony that the race can not progress in that which christianizes, elevates and perfects, while labor is degraded, and its followers reduced to serfs, slaves and dependants."

A letter in the same paper from Albert J. Wright, Boston, contains the following: "In all the meetings and conventions which the workingmen have held, it has been admitted, generally, that there is a great want of *union* among those whose condition we desire to see improved. This fact has been sincerely deprecated by all hands. There can be no concert of action, or agreement upon modes of action, for want of this union. There has been, naturally, a want of confidence among the producers manifested in regard to a proposal for any general movement designed to secure justice to the masses. The want of *union* has stared us in the face and met us at every turn when we have sought to fix upon any practicable method to accomplish our purpose. We have seen that the great mass of the working people have been more disposed and better prepared to devour each other, rather than to lend a helping hand. There has been no bond of brotherhood among them; no connecting link between one laborer and another to make them realize the truth that 'we are all brethren.' This want of union has stood before us like an insurmountable barrier to oppose all progress. How to overcome it is now the question. It is a question well worthy the serious and candid consideration of every friend of the workingmen's reform. It is a question which has occupied the thoughts and been the subject of the investigation of a few friends in this city for the last nine months. Unless we could discover some plan, practical and feasible, which would create the much-desired union, we have been ready to despair of ever accomplishing anything for the permanent benefit of the workingman."

The first report of this association contained the following:—

"The board of commerce, having been appointed a special committee, to whom was referred the subject of the difference between the wholesale and retail prices of teas, coffees and soaps, have investigated the subject, and ask leave to make the following report:—"

	Cost per pound, Wholesale.	Price per pound, Retail.	Per Cent of advance, per pound.	Average advance in cents, per pound.
Teas.				
Souchong,	$0 23	$0 36 @ $0 50	86 @ 117	20
Ninyong,	24	40 @ 48	66 @ 141	28
Y. Hyson,	48	58 @ 78	22 @ 66	20
Coffees.				
Java,	8½	12 @ 16	41 @ 88	5½
Maracaybo,	8¼	11 @ 12	33 @ 48	3¼
St. Domingo,	7	8 @ 10	14 @ 42	2
Soaps.				
No. 1,	4½	8	77	3½
2,	3½	7 @ 8	100 @ 128	4
Extra,	5	10	100	5
Settled,	6	12	100	6

This organization grew slowly for the first two years, although it had the indorsement of the numerous workingmen's associations, both state and national. The supreme division of the order was organized January 7, 1847, with Robert L. Robbins, president, Albert J. Wright, secretary and treasurer, with twelve divisions in the union—all but two being in the State. One of the first divisions formed was organized by a few working-women in Lowell. The first statistical information as to number of members, etc., was given at the session of the supreme division, October 5, 1847, in which twenty-five divisions were represented, having 1,993 members. At the first annual convention, January, 1848, a resolution was passed recommending divisions to adopt the cash system. From frequent discussions, as found in the records, it would appear that this recommendation was never fully adopted.

In the second annual convention, January, 1849, it was voted that associations of ladies be organized,—by "request of certain ladies." At this convention the constitution was altered and revised; the name was changed from Workingmen's Protective Union to New England Protective Union, and from Supreme Division to Central Division.

In the April quarterly session of that year, Mr. H. P. Trask offered the following resolution, which was adopted :—

"*Resolved*, That a committee be appointed to carry out that part of the constitution that referred to the organization of industry."

In July the committee on trade was instructed to provide a suitable *dépôt* for the deposit and exchange of produce and goods. In the quarterly circular of that date, is found the report of the committee on organization of industry, from which we take the following extracts, as evidence of the scope and purpose of the original founders of the association. The report is signed H. P. Trask, A. J. Wright, Peter I. Blacker, J. G. Kaulback, Jr., John F. Abbott.

"It is evident that to stop with simply succeeding in the trading department merely, we shall not have accomplished the one-half of the object of our association. Let us for a moment review the proceedings of our society. We commenced with this one *grand idea*, the elevation of the laboring classes. The dollar was to us of minor importance—humanitary and not mercenary were our motives."

"We saw a class of useless agents and money lords fattening upon the products of industry; we saw a system of competition which was beggaring the laboring classes, and operating to the injury of all classes."

"From the want of means we could not at first commence the organization of trade and industry at the same time."

"We were poor (a crime in civilized society); we were ignorant to a *great extent* of the arts and intrigues of trade, but saw enough to induce the undertaking of an experiment, and with faith in God and the right, we commenced our work by the purchase of a box of soap and one-half box of tea."

"Some dozen or more persons commenced in an upper chamber over the Boylston Market (a modest place in these times of extravagance) [October 6, 1845]. From that time we have never ceased to work, and the result has been success—success of the grandest import; it is no longer an idle dream, an experiment, but a common-sense system of conducting trade."

. . . .

"Solve, if you can, in any other way the cause of the poverty of the masses, other than the system of competition, which exists in all departments of industrial life; solve, if you can, to remedy this evil, but by the co-operative organization of industry, thus to enrich, elevate and bless our race."

"How is labor-saving machinery to be made to elevate the millions except to compel it to labor for, instead of against, their interest, as at present? Man's muscles and heart-strings are now made to compete with iron machines that need no rest, that have no affections, eat no bread;—is it to be wondered at that man fails to keep pace therewith?"

"Why always working, and but a step in advance of starvation? Why is he who produces everything, not only destitute of luxuries, but of the common comforts of life, to say nothing of a shelter which he can call his own? Beside the starving producer stands the man who never works, but lives and riots in wealth wrung from his half-paid producers, and by this same means makes large donations to colleges, wrung from the thin, haggard forms in his factories, workshops or counting-houses."

. . . .

"We shall then ask no man how many hours we shall labor, but each will share according to the amount of labor performed."

"We would commend to your notice, as being the most needy, the *seamstress*, with whom to commence the work of organization. Lamentable as is the condition of laboring men, that of the women is worse; and increasingly so, when the newly invented sewing machines shall accomplish all that now gives employment to thousands. Let us take this and kindred machines, and christen them for the good of the race, by shortening the hours of labor, while at the same time we increase the products of labor. Let us then assist in the formation of such an industrial union, that, example set, others will follow. We have a large market already existing, and having the advantage of large purchases, it can but be successful. To doubt is failure,—is rank treason. Give but the proper persons and the means, and the work commences forthwith."

"Slow, indeed, will these persons be in returning to the old methods of civilized industry, having tested the superiority of the new."

These early pioneers were all sound on the slavery question, as the following quotation will show:—

"We point you to three million slaves, clanking their iron chains, sweating blood for poor, miserable bread!"

But they were no less anxious for the white laborers of the North, as is shown by what follows:—

"We point you to the thousands upon thousands that fill our almshouses, to the anguish and hideous mockery of a life of dependence that follows! We point to the lone streets and garrets of all our large cities, filled with the anxious, careworn, yet unsuccessful seekers of employment!"

"Give employment and the product—we ask no more."

"We do not ask of you the loan of money in your official capacity, to the proposed society; but let such aid be individually rendered, upon good security without interest. Such a union, finding a market for their goods, for cash, would be enabled to do a large business with but a small capital; the principle being the same as in the trading unions. Thus can the laboring classes get rid of selling themselves to masters for the privilege of work when it is to be obtained."

"Thus work is guaranteed without going to capitalists, hat in hand, for their favors. Such organizations will place men in independent positions, so that tyranny can not say, 'Vote my ticket or leave my employ,' which with wife and starving little ones begging before him, obliges him to succumb."

"It places woman in a position where she can more effectually repel the advances of vicious men; it prevents waste of time and means that now are inevitable, and presents a system of economy we little dream of in these times of 'penny-wise and pound-foolish' policy. Our wretched and disease-breeding workshops will give place to grand palaces, devoted to labor and love."

"In that time coming, there will be no anxious care of where to-morrow's bread is to be had; no poorhouses in old age, with barred gates and grated windows, but plenty and beauty shall be poured into every lap."

"Brothers, shall we content ourselves with the miserable idea of merely saving a few dollars, and say we have found enough? Future generations, aye, the uprising generation, is looking to us for nobler deeds. Shall we disappoint them? No! by all that is great and good, let us trust in the truth of organized industry. Time, undoubtedly, must intervene before great results can be expected to accrue from a work of this character. We must proceed from combined stores to combined shops, from combined shops to combined houses, to joint ownership in God's earth, the foundation that our edifice must stand upon."

From the report of the committee on trade, January, 1850, we learn that "no expenses have been incurred in anticipation of increasing business; but as the receipts of produce and other goods will require it, a larger store will be obtained. The number of persons employed during the quarter has been four permanently and two transiently, making six in all."

In the same year the agent was appointed, and his commission fixed at three-fourths of one per cent for making purchases, and one per cent for selling produce. An assessment of three per cent per capita was made upon each member of the subordinate divisions to pay the expenses of the central division, which up to this time were as follows:—

During the year 1847, ...	$41 38
" " 1848, ...	115 44
" " 1849, ...	42 77
Amounting in all to	$199 59
There had been expended by the treasurer during this time, as appears from approved bills, for the legitimate expenses of the division, .	$258 74
From which deduct the amount received, . .	199 59
And they were indebted to the treasurer, .	$59 15

In July of this year, 1850, the store was found inadequate to the increased business. In the report of the committee on trade, at this session, they say:—

"The subject of distributing the products of labor has occupied the minds of many philanthropists in this country and in Europe, but no system has as yet been satisfactorily tested which would prevent capital from exercising the sole control over the products of industry, and exacting the largest share for merely permitting the exchange of products, by taking advantage of short crops to enhance prices beyond the reach of the mass of the day laborers, and causing privation and starvation; by filling storehouses with the necessaries of life, to be held for higher prices, and which often rot or are otherwise injured while the people are suffering for the want of them. Your committee believe that the system adopted by the union of distributing goods on the cost principle, that is, adding to the original cost just sufficient to cover all expenses, to be correct, and that by the steady co-operation of the divisions in concentrating the funds in one agency, the foundation will be laid for a better and more equitable system of commerce, which will secure to the laborer the products of his industry."

"That our institution has proved beneficial to the whole community where divisions have been established, is acknowledged in all sections of New England, as the tendency has been to induce the working class to adopt the cash system, and the traders, in their endeavors to compete with the divisions, have been obliged to come into the market with the cash instead of purchasing on credit."

In October, the secretary of the central division issued a circular to the subdivisions, in which he says:—

"The committee believe that much may be saved to the farmers and mechanics, by a better understanding and a closer communication with each other; as there is no good reason why a farmer, living one hundred miles from Boston, should send his butter and cheese to Boston when it is wanted in a manufacturing town within five or ten miles of his residence, as the whole expense of transportation, commission, etc., back to the manufacturing town are all paid by the farmer. The committee are fully aware that it is the work of time to eradicate the old notions of buying cheap and selling dear, without any regard to the amount of labor endured or expended in the production of an article. If agricultural labor is the most useful to the community, it should be able to command the labor or services of every trade and profession on equal terms."

The circular, after giving the condition of trade and the upward tendency of most articles in the grocery line, urged the subdivisions to deposit a certain percentage of their capital with the committee on trade, in order to assist the agent in his purchases. In the infancy of the institution the agent had used his private funds to assist new divisions, but with the rapid increase of trade, these were wholly inadequate.

At the October session, a resolution was introduced and rejected, recommending subdivisions to petition their legislatures for the passage of a general incorporation law for manufacturing and mechanical purposes. It was also voted to hold semi-annual sessions.

The anti-slavery agitation had taken a deep hold upon this band of reformers, as the following resolution presented by Mr. Trask, and adopted, will verify:—

"*Resolved*, That in the opinion of the central division, now assembled from all parts of New England, we hold that all men are born free and equal, and that the recent act of Congress, giving up our fellow-workingmen to the slave-hunters of the south, dispensing with the trial by jury, and making it criminal to do good to our fellow-workingmen, *is an infamous act, fit only to be trampled under the feet by every lover of justice and liberty;* and we pledge our lives and fortunes to its overthrow and final repeal."

They also voted to petition for the passage of the homestead exemption law.

The statistics of trade up to this time are as follows:—

Year.	For the Quarter preceding	Amount.
1848.	Jan. 1,	$18,748 77
	April 1,	24,359 02
	July 1,	33,000 00
	Oct. 1,	36,400 00
1849.	Jan. 1,	40,910 24
	April 1,	49,601 14
	July 1,	60,439 00
	Oct. 1,	69,851 22
1850.	Jan. 1,	102,353 53
	April 1,	126,301 92
	July 1,	150,831 30
	Oct. 1,	155,851 81
1851.	Jan. 1,	180,026 47

An analysis of the returns to the central division for the year ending December 31, 1850, gives us the following: Number of divisions formed, 106; 83 returned a membership of 5,109, and 84 returned a capital of $71,890.36, the highest amount held by any one division being $2,765.51, the lowest $150—an average of $855.63.

Sixty-seven divisions reported having purchased through the central agency, for the preceding quarter, $102,341.04, an average of $1,527.47. The same number of divisions purchased through other sources, during the same time, $136,715.79, an average of $2,040.53.

The amount of sales for 73 divisions for the year ending December 31, 1849, was $638,636.74, an average of $8,748.44.

The largest trade made through the agency by any one division was by No. 55, New Bedford, now in existence under the name of Central Union; during the last quarter of 1849 the trade of this division amounted to $6,269.89, on a capital of $1,422.63. This same division made total sales for the year of $31,278.64.

No. 17, Lawrence, purchased but $283 of the agency, and $11,772 from other sources. Their total sales amounted to $27,295. The largest total sale for the year was made by No. 16, Lowell, amounting to $39,918.90. This division made no purchases from the central agent for that quarter. Their capital amounted to $2,645. The largest per cent gained was on a capital of $808. The total sales amounted to $32,333, thus turning their capital forty times in one year.

At the January session, 1851, Mr. W. F. Young was elected secretary and treasurer.

At the April session, the committee on trade reported that considerable uneasiness prevailed in the matter of the sale of produce. Certain unauthorized parties had issued circulars that they were authorized to sell produce for the union. The purchases by the agent for the preceding quarter amounted to $181,633.16. A lady had also been engaged to purchase fancy articles.

The annual meeting was changed from January to October.

The committee on trade felt compelled to call attention to the growing distrust among the subdivisions. They say:—

"The agent can be of but little service to divisions who [sic] may be constantly jealous of his designs, or ready to impeach his motives in every instance where their expectations or fancies are not fully realized, and by cherishing such feelings they make themselves over-exacting, greatly to their own injury as well as his."

"The relation which the subdivisions sustain to the central agency, renders it highly important that the most amicable feelings exist between them at all times, which will not only tend to cement together and ennoble our fraternity, but also add in no small degree to our pecuniary advancement."

It will be seen from the following extract that they were not ignorant of the danger that would come from the failure to concentrate their trade. They say:—

"Your committee regret to learn that some of the subdivisions are in the habit of purchasing many of the common staple articles of merchandise on their own account, and ordering from the purchasing agent but a mere pittance of their bills, and that of the most difficult and perplexing character. The members of this union, we think, must be aware that the commission granted the purchasing agent is very small, and that should the course taken by some, as above referred to, be generally pursued by the divisions, it will become necessary in order to do justice to our agent, that the board of trade affix a discriminating ratio to commission the different classes of goods."

In their annual report, October 1, 1851, they say:—

"A large majority of the divisions are enjoying a good degree of pecuniary prosperity, and are well satisfied with our efforts in their behalf, constantly aiding us in our labors and encouraging us to new plans for making the power and usefulness of our institution felt, while a few others seem to entertain the idea that they owe the union no obligations whatever, and are not unfrequently found joining hands with its most insidious enemies. Such a course, if pursued to any considerable extent, must not only seriously diminish the influence of the central purchaser in the market, but also create discord and jealousy among the divisions, and finally lead to their dissolution."

The amount purchased through the agency for the nine months ending at date was $619,633.16.

The next session was held April, 1852. The committee on trade reported that "every effort to draw trade from the regular constituted agencies should be met with decided disapprobation by the friends of the union, as our strength and success depend upon united and co-operative action. It is hoped and confidently believed that sufficient intelligence and loyalty exist among the various subdivisions to resist all such attempts to destroy our concentrated efforts, and that we shall continue to present a united and harmonious phalanx in this great work of commercial reform. Experience has fully shown that there is no safety for protective union on the enemies' ground, and the more we yield to the 'tricks of trade,' the weaker we become in building up an institution which shall stand against all the craft and caprice of speculation and commercial rapacity. Abundance of testimony can be presented to show that those divisions which have proved truest to the union have proved truest to themselves, and become the most permanent and successful."

The next statistical returns we find in the "Journal of the Protective Union" for October, 1852, by which it appears that the number of divisions had increased during the preceding twenty-one months from 106 to 403. The amount of purchases had increased to $1,095,247.94; 167 of the subdivisions reported a capital of $241,712.66, all but two of which gave total sales for the year ending October 1, 1852, amounting to $1,696,825.46.

What the amount of business of the remaining 236 divisions may have been, or what proportion of that number had failed or closed up, does not appear in the record; but that some had failed, at this time, is a matter of history.

The journal from which we have quoted, says:—

"By taking a cursory view of the past, we find that the chief reason of the failure of some of our divisions-stores is the incompetency of the persons having charge of them; by this it should not be understood that many have proved losing concerns—far from it; most of them have been, and are, in successful operation."

In the same article, they say: "It is not always those who work cheapest that prove the best bargains."

The board of government, in their annual report, say:—

"The success of the Protective Union, as with all enterprises having for their object the good of mankind, depends upon two important requisites,—correct principles and the proper persons to carry them forward. In our principles we have unshaken confidence, strengthened by every day's experience, and it is hoped that our movement embodies the spirit and devotion which shall render it proof against internal imbecility and corruption, and external aggressions."

"The future of protective union depends upon *men*. Especially should all its offices be filled with those who combine practical business talent with enlarged views of human rights and human duties. We want no mere fanatics to lead us on to nothingness—persons who ridicule the plainest truths of political economy because above the reach of their mental vision, and deny the existence of the very stars because they can not see them at noon-day."

"On the contrary, our enterprise requires men who, while they do not forget that they belong to the earth, and are therefore earthy, are not afraid to look upward and onward, seeking for new opportunities to render themselves and their cause useful to the world."

"While we should guard against the mere enthusiast and theorist, who would impose upon the child the duties of mature years, let us not forget that youth and manhood may be dwarfed and crippled by the swaddling clothes of infancy. Ours is a practicable and humane movement; let us conduct it as practicable [sic] and humane men."

In 1853, the complaints that had been multiplying for the past two years, took active opposition to the renomination of the purchasing agent, and he resigned, by request of the committee on trade, in January of that year, and another was appointed to fill his place, the former agent promising to take a subordinate position. After a few months he called, or there was called in his interest, a special meeting, at which the board of trade were instructed to appoint two purchasing agents, the former agent as one of the two.

The committee on trade, at its next meeting, believing the action of the special session unconstitutional, and as the former agent had already opened headquarters on his own account, declined to recognize him. Then commenced a battle of circulars that would furnish interesting reading as a history of co-operative efforts, but which hardly comes within the scope of this investigation.

From this time definite statistical information of the branch under the old agent is not accessible. Both branches claimed to be the original,—that agreeing with the old board of trade continuing as the central division, and the other adopting, some years after, the name of American Protective Union.

Immediately after the division of 1853, a circular was issued by the board of trade, asking the subordinate divisions to assist in the publication of a "Journal of the Protective Union." This seems to have been favorably responded to, and was published under the direction of the board of government. In number six, we find an account of the proceedings of the central division, dated October 6, 1853. At this session the central division was reorganized. Albert J. Wright of Boston was elected president; W. F. Young, secretary. Delegates from fifty subordinate divisions were in attendance.

In the report of the board of government, we find a return to the early principles of the organization. They say:—

"The present system of commerce, like the feudalism of the Old World, taxes the laboring many to support the idle few. While commerce revels in luxury and elegance, adding little or nothing to the true wealth of the land, labor, the producer of everything useful, is overworked, stands unprotected in the market places, and is poorly represented in the legislative assemblies."

"Equality of rights can be but little less than a byword and an unmeaning flourish, unless it confers equal opportunities to labor, and equal enjoyment of all the social, intellectual and commercial results of labor. To labor, justly belongs the first fruits of industry. The working classes are the only rightful heirs to the products of their own hands, and the varied achievements of their physical and intellectual powers."

"In view of these considerations, it becomes the friends of the Protective Union at all times, and especially on the present occasion, to make the success and perpetuity of their cause a paramount object. Personal ambition and preferences, and party rivalry, should not be suffered to invade and disturb our deliberations. Our institution was not established to confer favors, but to secure rights; not to build up sinecures, but protect all useful members of the community from the unjust exactions of modern commerce."

"The history of the past warns us to guard well our institutions against the schemes of self-aggrandizement and personal aspirancy [sic]. All popular governments and associations, however correct their principles or however honest their supporters may be, are liable to be invaded by ambition and love of power."

"The members of the various subdivisions of the union owe allegiance to the particular divisions with which they may be directly connected, and should never allow self-interest to overrule their regard for the general good. The same may be said of the subdivisions, as they hold the same relations, in point of principle, to the central organization, that the members of the several subdivisions do to the organization of which they are members. Ours is a confederacy to promote individual and general good, by collective action, and to secure *either* we must be true to *both.*"

"It is to be regretted that some of the divisions are disposed to adopt the policy of joint-stock companies, of selling goods at considerable advances and declaring dividends among the shareholders from the proceeds, thus perverting the original purposes of the union. The design of the Protective Union is not to make, but to *save*, money, and the profits which, under the old system of trade, went to swell the coffers of the exchanger and speculator, belong, under the new, to those who buy the goods."

"All saved by the union system of trade, above what is required for the safe and economical management of union stores, should go to the consumer. Connected with this is another subject, which has been the cause of frequent embarrassment to the government in the discharge of their official duties, and which calls for consideration. We refer to the frequent efforts on the part of individuals, now that the union system of trade is somewhat popular, to seek a connection with the union to gain some local or personal advantage, without conforming to the spirit or purposes of the constitution. The government has been often called upon, by letter and otherwise, by those who seemed to suppose that all the central division had to do with petitioners for new organizations, was to assign them a number, and give them a license to sell more goods, and more effectually fleece the people than they could under the old system of trade, and thus have their schemes sanctioned and sanctified by the union."

"It is hoped, for the safety and perpetuity of our movement, that all such efforts to divert the influence of the union from its original object will meet with a steady and decided disapproval, and that the New England Protective Union will continue, as heretofore, the people's cause, through which they shall be enabled to limit the profits upon necessities [sic], and add to the comforts and blessings of labor."

The board of trade, in their report, referring to previous trouble, say:—

"It is with feelings of sincere regret that we are compelled to say that the bond of union is broken, and discord is in our midst; that that brotherly love which has been cherished, one toward another, has been exchanged for rancor and hate. Those who have been the warmest friends have now become the bitterest enemies. Those who have professed an eternal allegiance to the interests and welfare of the New England Protective Union, never seeking for place and power only as it might advance the union, are now arrayed in open hostility to your central agency, seeking to undermine the firm basis upon which it had rested, proof against all the designing machinations of merchants, but tottering from the oft-repeated sallies of its pretended friends."

They report that the amount purchased by the agent from February 3 to date, October 6, was $644,809.88; amount of produce sold, $50,000.

The same organization, under report of October 1, 1855, gave for the year ending at that date, amount of purchases, $870,607.25; sale of produce for members of subdivisions, $74,702.64. Aggregate business, $1,130,719.29. Number of divisions reporting, 72, with 4,527 members. Capital invested, $203,564.21.

The next session was held October 1, 1856. The amount of purchases for the year preceding was $828,692.56; amount of produce sold, $39,968.93. Sixty-three divisions reported 3,584 members. Capital invested, $130,912. Amount of trade for year, $1,005,882.02.

In the report of the board of government, they review the advantages of the union system, claiming that a poor man is able to save ten per cent of his earnings, and give this picture of the moral bearings of the system.

The "Journal" says: "The present system of trade is corrupt and corrupting. It ingulfs our young men in reckless extravagance and crime, the painful evidences of which may be seen on every hand,—in town and country, at home and abroad, on sea and on land. Its rust is upon the hearts of our old men, while those in middle age are weighed down by the lusts of its ambition. It bribes our statesmen, holds censorship over our pulpits, and fills the land with the cant and flatteries of a venal commercial press. Rome, in the midst of her pride and splendor, fell a victim to her commercial excesses. Let us beware! Justice to useful, productive labor, is the fundamental idea of a true republic. Political economy which fails to recognize the essential primary relation which exists between production and consumption, independent of all commercial devices, is a counterfeit and a sham."

"The New England Protective Union ought not to fail of its real mission, and prove false to the spirit which gave it existence. The immediate advantages which accrue from union stores, by the way of trade, however important and needful, in themselves considered, are petty and insignificant in comparison with the philosophy which underlies the movement,—a philosophy, perhaps, hardly thought or dreamed of by the mass of its beneficiaries."

"If this organization takes deep root in the moral and social structure, drawing life and strength from the immutable principles of universal and impartial justice, it will become a vital, living spirit, and do much, not only to mitigate present wrongs and privations, but also render important service to the cause of man's permanent social, moral and political elevation."

"On the other hand, if narrowed down to the mere idea of present saving,—seduced from its high purposes by the spirit of speculation, or the croaking of pretending but false friends,—it will become merged into the present commercial Babylon, and gradually die out, leaving an inglorious record of the infidelity of its advocates to truth and duty."

The prediction in this concluding paragraph proved true. In a copy of the "Journal," dated September, 1857, we find the following statement of the difficulties which the union encounters:—

"The management of union stores, we regret to say, has not always fallen into competent and judicious hands, a circumstance not unheard of in connection with all human enterprises; and in consequence thereof distrust, dissensions, embarrassments, adoption of the credit system, and finally 'selling out and closing up' have followed."

"The most grievous hindrance to the success of union stores, thus far, has been the employment of incompetent, unfaithful and scheming managers and clerks,—often men destitute of correct business habits, unfriendly to the principles and objects of the organization, and given to trickery and craft. Stores, under such management, will soon break away from the safeguards of the system, and gradually run into the old channels of trade and the adoption of the credit system, with all their uncertain and ruinous consequences, and finally 'blow up,' as they ought, being nothing but shams."

Another difficulty of the stores was stated by Mr. Devereaux: "He wished to offer a word in relation to the suicidal tendencies which exist among union stores to break away from the central idea, thereby weakening themselves and the whole movement. He believed a too general disposition prevailed among the divisions to listen to the advocates of the 'old-line' system, and that the 'tricks of trade' were working mischief among union stores."

The American Protective Union was a branch of the New England Protective Union. The agent of this branch informs the writer that the total sales of the several years, to 1859, were as follows:—

1853, . .	$1,100,000 00	1857, . .	$1,400,000 00
1854, . .	1,536,000 00	1858, . .	1,400,000 00
1855, . .	1,400,000 00	1859, . .	930,376 36
1856, . .	1,492,000 00		

The only printed report which we have been able to examine of the American Protective Union, was that holding its session in New York, September 14, 1859. At this session but 36 divisions were represented, although the agent reported the purchases of the division to amount to $930,376.36. An attempt to find the number, standing and character of the subdivisions proved unsuccessful. The board of government believed there were 600 stores doing business on this method. They presented, as the great problem for solution, the question, What measures should be taken to secure the co-operation of subordinate divisions?

Their expenses for the year were $95.05; income, $143.45. From 1853 to this date this branch seems to have done nothing in the matter of the organization of industry, or the agitation of the labor question, or spread of co-operative literature. At this session the committee on trade called the attention of delegates to the fact that the idea of pecuniary gain occupied but a very limited place in the minds of the original founders or advocates of the institution.

In the report of a special committee, made at the same session, the object of the organization is said to be, "It is an association of American citizens, seeking to accomplish an economical reform in the trade system, by simple yet practical means,"—thus having narrowed itself down to trade purposes only.

As this report contains a very excellent synopsis of their theory and method, we quote:—

"The means of dispensing and enjoying the available privileges of this organization are to bring into operative exercise so many of the powers of the human mind as are necessary to accomplish the necessary supply of human wants for necessary convenience, or even the enjoyment of luxuries, with the least possible expense between the producer and the consumer. To do this in the most successful manner 'protective union stores' are created, and trusty men put in charge of them, and a concentrating of capital and trade is made by men generally of moderate means; agents are appointed, whose duties are expressly defined by written rules. These divisions (as they are nominally termed), or separate mercantile establishments, dotting almost every place where there is sufficient enterprise and sagacity among the people to take any measures for self-protection, were, in their early stages, rather in the character of an experiment; but that day has long gone by, and it is now known with an illustrated certainty that an establishment founded on these principles, and managed by sagacious and honorable men, will not only succeed triumphantly in any civilized community, but will be the means of dispensing pecuniary and social blessings on members fourfold greater than can be derived from the same amount of capital invested and managed in the ordinary mode of mercantile transactions. Experience, however, has had the effect to suggest some little improvements in the practical workings of this system."

"In its early stages it was thought even unwise to extend its privileges to any other than those pecuniarily interested in its operations, thus excluding all but members and their families from participating in the trade; but this restriction was soon found to be both illiberal and unnecessary. A more philanthropic spirit prevailed, and admitted an extension of trade to any party making prompt pay on an amount of profit equivalent to cover all necessary expenses and incidental liabilities in conducting the affairs of the institution. This plan has been eminently successful and beneficial; and is yet deemed the true policy in arriving at success, and accomplishing the grand object contemplated by the originators and promulgators of the system."

They state that their object is a compound one:—

"1. They would place themselves and their coadjutors in a position to enjoy all the necessaries of human life at a price as near as possible at prime cost."

"2. They would teach their contemporaries the true method of extricating themselves and their posterity from the prevailing pecuniary evil of extended mercantile credit."

They also state some of the errors into which the division had fallen to be in the method of applying their percentage in the sale of goods. Having decided that the goods must be sold at a specified profit on their cost, they applied a definite proportion of such profit on every article, without considering the ability of the article to sustain the price.

The committee recommended a general discriminating application of percentage. They also state that it is common to make a discriminating distinction between inside and outside trade. They confess that all are looking forward to an annual dividend, "which," they say, "in any social or pecuniary enterprise appears to be so congenial with the sympathies of man's fallen nature that it appears to possess almost the property of an electric spark, dispensing vitality and energy," and they suggest whether it is well "to haul so close in the wind of philanthropy as always to be endangered by the breakers of deficiency, or, by some misfortune, to dash on the rocks of bankruptcy."

From the first, the order was wholly opposed to the use or sale of intoxicating drinks, as will be seen by reference to qualification for membership, which contained this clause: "That persons must be of good moral character, who do not use or vend intoxicating drinks."

In a pamphlet issued by the chairman of the committee on trade, 1856, the writer gives as the two most serious evils of our republic,—intemperance and the credit system. He says: "If the man who has imbibed the habit of an occasional or habitual indulgence of an appetite for an intoxicating beverage could by any means, either persuasive or restringent, be induced to abandon his cherished cup, he would be entirely free from the danger of becoming an inebriate. His mind would be left at full liberty to perform the functions for which it was designed by the economy of nature. His health would never be impaired by the deleterious influence of the poisons of alcohol on his digestive and vital circulative organs. His social relations would never become embittered, reprehensible and unsupportable by the evil effects of intoxication on his intellect, his conjugal propensities or his irritable human passions. His fireside associations would never become changed from that of the confiding friend, the endearing husband, the protecting father, and honored social citizen, and defender of his country's rights, to that of the treacherous enemy, the repulsive intruder in the bosom of his family, and a pest and outcast from the bands of society, and finally, as a last resort, for relief, to become the occupant of a drunkard's grave."

"But another evil, not much less important and equally remediable, which has long hung over and darkened our political, social and pecuniary prosperity, is that system of excess and the indulgence of extended credit, so sought for and practised in the general mercantile transactions of the citizens of the country."

"As the manufacturer of intoxicating beverages pampers the appetite of the credulous, habitual drinker, stimulating him to the belief that a little further indulgence would animate his spirits, and render him more active and buoyant; so the wholesale merchant plays upon the credulity of the retail dealer, prompting him to indulge in the snare of an extended credit, with the sole view of vending an excess of goods at an excessive profit, thinking that by so doing a larger amount of trade may be secured to his probable advantage. And as the retailer of the liquid poison, whether in the splendid hotel or the diminutive groggery, trifles with the health and happiness, as well as the peace and prosperity of the inebriate, unmindful of any higher rule of moral honor than the advancement of his interests, or the demoniac disposition to bring his unsuspecting victim to the same immoral level with himself; so the retail dealer in merchandise is prompted to stimulate the vanity of the honest consumer to gratify indulgence in extravagance and unnecessary display of false appearances altogether hostile to his true interest, looking upon frugality and economy as mere commonplace abstracts, until an amount of indebtedness is accumulated beyond his power to cancel without ruinous sacrifice, when the reflection plays spasmodically on the equanimity of his reflective and reasoning faculties, making him morose and petulant by the weight of his disappointment; his social habits undergo a radical change in the common civilities of human intercourse, and too often the exhilarating associations of the grog-shop are vainly resorted to, to stifle the horrors of disappointed ambition; and the once abstemious and industrious fellow-citizen and his confiding family dependents are brought to the necessity of submitting to bankruptcy, and falling into disgrace and hopeless poverty, or of attempting to rise again from penury at a stage in life less promising than that from whence they have fallen by means of the misguiding system which has led them astray in the morning of their active life."

No reports of later date are at hand. The secretary of this branch says that he assumed his office when the organization was in its last stages. Many divisions had given up any distinctive features; meetings were omitted; credit was given and taken; shares were held in fewer hands, and the usefulness of the organization ended.

In a review of the causes of its downfall, it will be found that the first disagreement seemed to be upon the qualifications of the purchasing agent. It was the duty of the committee on trade to select and recommend a faithful and competent person to act as agent in making purchases, and to superintend the mercantile interests of the union.

The committee of 1853 claimed and were known to be friends of the agent. They first attempted to harmonize the conflicting interests already existing to an extent that threatened a division among the very pioneers of the union. They gave a hearing to the complainants, and afterward recommended the reappointment of the agent, subject to the condition that he was to carry out certain recommendations submitted by them. In the month of January, they were again called together by the agent, and found that their advice and recommendations had been almost totally disregarded or neglected, and that some of the dissatisfied among the complainants had taken preliminary steps toward the establishment of another agency.

The committee then commenced a more thorough examination, lasting four days; the result of which was the request for the agent to resign, to which he reluctantly consented. One of his intimate friends was appointed to fill the vacancy, and the former agent was offered any situation suited to his tastes and wishes, at a liberal salary.

In February, the agent addressed the subdivisions with a circular, thanking them for past kindnesses, and asking for settlement of accounts, giving notice of his resignation. This was followed by circulars from several of the subordinate divisions, denouncing the board of trade, and sustaining the past agent. Other divisions took up the matter in favor of the board of trade, in which an enumeration of the disqualifications of the past agent is given, and indorsing the integrity of the board of trade.

March 16, a special session of the central division convened. It is said that the delegates came together "more like exasperated combatants" seeking personal revenge, than wise men assembled to legislate for the good of a great institution. After a session of two days, it was—

"*Resolved*, That we, the delegates of the several subdivisions here represented, utterly disclaim any intention to impugn the motives which influenced the action of the board of trade in requesting the resignation of ——, however unfortunate we may regard it. That, as a board, we give them full credit for manifesting in their action an honesty of purpose to prevent a schism in the union, and a commendable zeal to promote its best interests,—to enlarge its borders and strengthen its stakes.

"*Resolved*, That we have now (as we always have had) entire confidence in the integrity, ability, untiring energy and efficiency of ——, as exhibited in the discharge of the arduous duties of purchasing agent for the union up to the date of his resignation, reaching from its infancy to its manhood.

"*Resolved*, Therefore, that while we much regret his resignation, that we respectfully request of the board that he may be again called into the service of the union as purchasing agent."

They were further instructed to recommend two persons as agents in the city of Boston, one in the city of New York, and one in Portland, Me.

At the April meeting of the committee, it was ascertained that the former agent had already opened an agency, and the committee sustained their previous action, ignoring that of the special session on the plea of its unconstitutionality, section 2 of article 3 defining their duty to be "the establishment of one office and appointment of one agent for the city of Boston."

On March 17, a meeting was held in Boston by some of the delegates to the special convention who were favorable to the former agent, at which a provisional or advisory committee was appointed to carry out the will of that session in reference to the re-employment of the old agent. He was requested by these gentlemen, representing, as they said, certain divisions who would no longer trade through the agency established by the central division, to open his office at his old stand, the other agency having been removed to another place.

The committee on trade held another meeting, April 27, 28, 29, the proceedings of which were printed and forwarded to the different subdivisions, together with a lengthy statement of the situation. This action called for still more circulars denunciatory of the board of trade, and replies were made that widened the breach. This was continued by circulars from 1853 to 1858, and a competitive struggle was made for the trade of the different subdivisions by the antagonistic purchasing agents.

The New England Protective Union, as an organized effort for the amelioration of the working classes, practically ended in 1853. As a co-operative effort on the joint-stock plan for the concentration of trade, it succeeded in part, probably up to 1857 or 1859. For four or five years after this date, a fair amount of goods was purchased through the several agencies.

Many of the stores continued the old sign, though generally they were the property of the storekeepers who had from time to time bought up the shares. Some few stores yet remain conducted in about the same manner as formerly, the most remarkable case being one located in Worcester, doing a business of about $200,000 a year. The members of this division are mostly well-to-do people. An account of one at Natick is given farther on. Other stores, organized under the New England Protective Union banner, have since been incorporated under new names; the remainder are things of the past.

The War of the Rebellion had a considerable influence in hastening the demise, or rather the burial, of the organization. In some of the country towns, where farmers were the larger shareholders, they became disturbed and frightened, and very gladly sold out to the storekeeper.

Boston Tailors' Associative Union.

This organization was formed in 1849. Its object, as set forth in the constitution, was to provide labor for each other by the manufacture and sale of clothing of every description, and the purchase and sale of such other articles as are generally sold at clothing stores. The board of directors were given the power to appoint and discharge the assistants, and all the powers of administration. The shares were $50 each. Any person working in the store three months, and having paid all demands, and being a member, had a vote in the division of the profits; all other persons (not workers) who invested money in the enterprise being considered lenders, and not entitled to vote. No member not being one of the board of directors could interfere in any way in the business of the store. The right of complaint was granted, but it was to be made in writing. An account of stocks was taken annually, and the profits divided according to the amount of labor performed. They sold for cash; each article was plainly marked at the lowest price; any salesman asking more than this price was to be discharged. Large, lofty, well-ventilated workshops were to be procured, water was to be brought into the building, and washbowls, towels and baths provided; no member to be allowed to work more than ten hours per day. This organization existed a few years.

From 1860 to 1864, little or no attempt was made in the direction of co-operative distribution or production.

The trades' unions had continued their organizations, and established a trades' assembly in Boston, composed of delegates from their several associations.

Out of this organization grew the Boston Labor Reform Association, which established its office at 221 Washington Street. Their first circular was headed, "Labor Reform—The *Discharge* of all Useless Middle-Men, and the Abolition of all Useless Working Hours."

This association was sustained by private subscriptions of workingmen in Boston, Fitchburg, Taunton, Winchendon and Portland, Me. They issued circulars and addresses, from one of which we make the following extract:—

"We are to organize, of course, in harmony with the real interests of society, which are, first, a more rapid increase of wealth; and, second, its more equal distribution. The great task is to set all idlers to working, and all workers to thinking. The common mistake is in stating our difficulties as a conflict between 'capital and labor.' New England supports more than 85,000 middle-men or merchants, twice as many as necessary. Suppose each one costs $400 a year, in time, rents and fixtures, the amount saved in discharging one-half would be $17 to every man, woman and child in New England, or an aggregate of more than $17,000,000. The burden of their support falls heaviest upon the cities. They cost Boston $33 per inhabitant a year, if $1,000 is allowed for time, rents and fixtures for each middle-man.

"Aside from custom-house duties, New England paid in taxes to the national government, for the year ending June 30, 1863, *about half* as much as she pays to her *useless* middle-men. They can be set to *producing* by good management,—not, however, by clamoring at the avarice and heartlessness of capital, nor by thoughtless people flocking from store to store, buying just enough at each to keep them all in existence, but by organizing and concentrating their trade upon a few who are capable of doing all the work of distributing, and turning the rest to productive labor."

The circular suggests a systematic exposure of cost and sale prices, and the establishment of a farmers and manufacturers' exchange in the interest of workingmen; and concludes with a brief statement of the argument for a reduction of the hours of labor.

Their first attempt at co-operative distribution was in the sale of coal. From their circular of July, 1864, we give the following terms: —

"To all union men, widows and wives of union men, and widows of soldiers, 75 cents less per ton than the market rates. To all mechanics and laboring men, *not* members of any union, 50 cents less per ton than the market rates": by which it is seen a preference is given to union men.

Their second attempt was in the sale of produce, flour, etc. Their method was to furnish tickets to every member of those societies connected with the association, containing name of holder, the amount, date and number of months for which it held good.

On the reverse side was contained the name of the articles, place of sale and explanation of ticket. It also contained on its face the following sentences:—

"The comparative poverty of the real producer is traced to his support of a large and increasing number of non-producers standing between him and the consumer."

"The comparative ignorance of the producer is accounted for by the little time left for study and thought after ten or more hours' labor in producing."

In the coal business, their plan was to concentrate trade by leaving all orders for coal with the agent, who, with this advantage, could make it possible for the three or four dealers receiving all his orders to sell cheaper than the regular rates.

In their coal circular, they say:—

"Concentrate your trade by buying through the workingmen's agent. If it succeeds, it may be ranked as flank movement No. 1, of labor upon unproductive capital. Productive capital and labor are natural allies. The success of this movement ensures a still greater reduction in the price of coal than will be possible to secure in the first attempt. Union men and all interested in a 'closer relation and co-operation between producer and consumer' will favor this, the first systematic effort on the part of workingmen to lessen the number of 'useless middle-men.'"

In 1865 they were incorporated under the following Act:—

"SECT. 1. Ira Steward, Bartlett J. Brown, George H. Mills, Charles W. Livermore, their associates and successors, are hereby made a corporation by the name of the Boston Labor Reform Association, for the purpose of improving the condition of the mechanic and laboring classes in their various occupations by imparting scientific and practical knowledge of the same; as also their general improvement by the diffusion of knowledge through lectures, libraries and such other means as may be applicable in the city of Boston, with all the powers and privileges, and subject to all the duties, restrictions and liabilities set forth in the general laws which now are or hereafter may be in force relating to such corporations.

"SECT. 2. Said corporation may hold real and personal estate to the amount of twenty-five thousand dollars, to be devoted exclusively to the purposes aforesaid.

"SECT. 3. This act shall take effect upon its passage."

This association continued its agitation, in connection with the sale of coal, by publishing tracts and pamphlets, one of which was "Holyoake's Moral Errors of Co-operation."

It continued active operations for a year or more. It declared "strikes expensive, unsuccessful and incompatible with a moral movement invoking legislation and public sympathy, and as tending to discourage, rather than encourage, the investment of capital in productive labor." It defines its real powers to be in moral means alone.

About this time co-operative stores were formed in Boston, Roxbury, Charlestown, Chelsea and Fitchburg.

The Roxbury experiment continued for several years, at times paying very large dividends, but finally becoming the property of one individual. The Charlestown store had a longer existence, and was conducted on a near approach to the Rochdale plan. Its failure had a very discouraging effect on other enterprises. The Chelsea store was for some years very successful, and continued its existence longer than the others.

Some of the active members of the Labor Reform Association were also members of the co-operative stores, and, strange as it may seem, some of these stores were in active competition with the association in the sale of coal, the purpose being to still further increase the dividends to the shareholders, the effect being to create discord and destroy the usefulness of each.

On the demise of these associations, the active agitation for a reduction of the hours of labor was resumed; associations were formed, conventions held, and certain labor legislation effected.

The co-operative spirit again revived, this time many societies adopting the system of the Rochdale Equitable Pioneers of England. The following are those of which we have any record: Sandwich Workingmen's Co-operative Association, organized November 3, 1866; South Reading (now Wakefield), November 28, 1866; Acushnet (New Bedford), November 1, 1867; Lynn Workingmen's Co-operative Association, September 5, 1867; Fall River Workingmen's Co-operative Association, November 15, 1866; Cochituate Protective Union, March 30, 1868; Gardner Co-operative Association, May 30, 1868; Lynn Co-operative Grocery Company, November 25, 1868; Charlestown Co-operative Manufacturing Association; Florence Mercantile Company; Medford Citizens' Union Store; Taunton Co-operative Association; First Worcester Co-operative Grocery and Provision Association; New Bedford Workingmen's Co-operative Association; East Abington Union Company Co-operative

Store; Natick Protective Union Store; North Bridgewater Co-operative Store; Randolph Co-operative Store; Somerset Co-operative Foundery; Westfield Cigar Makers' Union.

A year or two later the co-operative shoe manufactories in North Adams and Lynn were formed; but as these are treated of in the reports of this Bureau for 1871 and 1875, somewhat at length, further reference to them is omitted.

In 1869 the labor movement took a political form, principally under the guidance of the leaders of the Crispin organization.

In the platform of the Labor Reform Party (1871) is contained this plank; first under "measures and demands":—

"We demand that every facility and all encouragement shall be given by law to co-operation in all branches of industry and trade, and that the same aid be given to co-operative efforts that has heretofore been given to railroads and other enterprises."

The same year the International Grand Lodge of Knights of Saint Crispin published a report on co-operation, in which they say:—

"We regard the trades' unions simply as an agent, a 'means to an end,' that should be to secure to the laborer a just reward for his toil, and in so far as they afford the means of resistance to encroaching capital, and in their acknowledged educational influence over their members, they are indispensable; but we can not help thinking that if they stop with simply preserving their numerical strength, they are in the long run apt to fail and become extinct. So then, your committee, while urging the use of every honorable means to preserve the integrity of the order, and extend its influence and usefulness, would just as earnestly urge our brothers to use their utmost endeavors to build up in the order a system of co-operation in both trade and manufacture; for in so doing they would not only improve their own condition, but lift the order into a position of the highest respectability and influence." They conclude as follows:—

"Our view is, that whenever the brothers can raise the capital they should organize at once, and also that lodges having surplus funds should invest them in starting co-operative manufacturing, or in aid of those already established.

Again, we would advise the formation of clubs, or co-operative stores, and set apart the profits, or a portion of them, in aid of co-operative manufactures, and in that way build up a fund. Perhaps in that way we may gradually work into self-employment better than any other. Then again, we would advise brothers to form small clubs for manufacturing. In France and Germany this plan has been tried successfully. Can it not be made so here? We believe it can."

As a result of this stimulus, some of the co-operative manufactories and stores, referred to above, were formed; facts in relation to which, other than contained in previous reports, have not come to hand. Most of these efforts failed.

Co-operative Building Company.

The report of the Bureau in 1870 called attention to the condition of the Boston tenement houses. The press continued the investigation, followed by the Board of Health. As a result of this agitation, some of the wealthier citizens organized a company for the purpose of providing better homes for the poor.

In May, 1871, they obtained an Act of incorporation under the title of the "Boston Co-operative Building Company." The Act is as follows:—

Be it enacted by the Senate and House of Representatives in General Court assembled, and by authority of the same, as follows:—

SECT. 1. William Gray, Abby W. May, Henry B. Rogers and Anna Cabot Lodge, their associates and successors, are hereby made a corporation by the name of the Boston Co-operative Building Company, in the city of Boston, to hold and improve real estate in said city, as homes for working people, at moderate cost; with all the liabilities, duties and restrictions set forth in all general laws which now are or may hereafter be in force relating to such corporations.

SECT. 2. Said corporation shall have power to hold real and personal estate, for the purposes aforesaid, not exceeding two hundred thousand dollars in value.

SECT. 3. The stock of said corporation shall be divided into shares, each of the par value of twenty-five dollars, and the dividends on said shares shall not exceed seven per cent per annum on the par value thereof.

Sect. 4. Said corporation shall make a return annually to the board of state charities, of the amount of capital assessed and paid in, of the amount invested in lands and buildings, and of all expenses incurred in the management thereof, and of all receipts from rents or other sources, and the dividends declared during the year.

Sect. 5. This act shall take effect upon its passage.

In April of the next year their capital stock was increased to $300,000, and they were authorized to hold and improve real estate outside the limits of Boston.

The published list of stockholders shows that the shares were held by 187 persons. They commenced operations by hiring, on a lease of five years, the building on Lincoln Street, known as the Crystal Palace, and the building of an estate on East Canton Street, at a cost of $142,000.

As these reports have never been given in any public document, we give the report of the treasurer for the year ending January 1, 1876:—

Capital stock paid in,			$217,500 00
Invested as follows:—			
East Canton Street estate,	$166,031 55		
Less amount on contract,	19,415 00		
		$146,616 55	
Webster Avenue estate,	$9,100 00		
Less amount on mortgage,	4,800 00		
		4,300 00	
Lincoln building,		2,861 98	
Country houses and lands in Dorchester,		40,704 10	
Land contracts for houses and lots sold,		17,122 59	
Atlantic Cotton Mills note (part*),		5,894 78	
			$217,500 00

Statement of Income for 1875.

1874. Dec. 31. Balance from last report,		$11,854 85
Less due from receipts of 1874:		
Dividend No. 4, of 3¼ per cent,	$7,212 95	
Renewal fund,	2,500 00	
		9,712 95
Net balance *(amount carried forward)*,		$2,141 90

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* The balance of the $9,000 of this note consists of income invested.

Amount brought forward,			$2,141 90
Rec'd rents E. Canton S't estate,	$19,150 20		
rents Webster Ave. estate,	1,036 00		
rents Dorchester estate,	100 00		
		$20,286 20	
Interest (balance of account),		206 88	
			20,493 08
			$22,634 98
Expended East Canton Street estate,		$4,669 06	
Webster Avenue estate,		395 95	
dividend No. 5, of 3½ per cent,		7,488 89	
general expenses,		194 71	
			12,748 61
1875. Dec. 31. Balance to credit of income,			$9,886 37
From which is to be paid dividend No. 6, of 3½ per cent,			7,592 37
Net balance,*			$2,294 00

Trial Balance, December 31, 1875.

Capital stock,		$217,500 00
East Canton Street estate,	$166,031 55	
Lincoln building,	2,861 98	
Webster Avenue estate,	9,100 00	
Treasurer of Lincoln building,	202 93	
Indebtedness account,		24,215 00
Notes receivable,	9,000 00	
Income,		9,886 37
Country houses,	40,704 10	
Renewal fund,		4,213 00
Boston City 6 per cent bonds,	2,010 00	
Old Colony Railroad 7 per cent bonds,	2,165 00	
Dividend No. 3,		3 50
No. 4,		5 25
No. 5,		858 87
Office account No. 3,	3 50	
No. 4,	5 25	
No. 5,	113 37	
Land contracts,	17,122 59	
Cash (general account, $6,616.22; dividend account, $745.50),	7,361 72	
	$256,681 99	$256,681 99

(E. & O. E.) CHARLES P. BOWDITCH, *Treasurer.*

BOSTON, December 31, 1875.

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* This shows a nominal gain of $152.10, against which is to be set a loss on account of the Lincoln building of (for the year 1875) $669.11, and a proportion of the original cost of the improvements on the building not paid for by the earnings.

September 1, 1871, the company took possession of the Crystal Palace and remodelled it into a comparatively healthy tenement house.

The sub-committee of the company, in their report for 1874, speak of their efforts as follows: "During the past year we have continued the same influences upon the children as before, and we have added an industrial school, where boys are taught to mend furniture and carpenter work, cane-bottoming of chairs three evenings a week. We have nine scholars. All seem interested in the work, and we intend gradually to increase the number. They are selected from among the older boys. Some of them, from the evil influences pressing upon them, were liable to become drinkers of beer, night prowlers, and the future burglars and desperadoes of the community Over them, hitherto, we have apparently had but little visible influence. Now, they are induced to spend three evenings in the week in healthful mechanical work. The zeal of some of them is admirable, and that interest is stimulated, perhaps, by the fact stated to them that we hope to make the establishment a paying one, and if so, each pupil and teacher shall have his share of profit according to the number of hours he has been at work. A time-table is accurately kept each evening, so that even a tardiness will tell upon any possible profit. Of course, to make the school a perfect success, we need assistance in the way of funds and work. The committee issued a circular to all owners of our stock, 157 in number, and also to several of the school committee, enclosing a postal card, asking merely for 'old chairs to mend.' As yet, about one in twenty has replied. Perhaps it is well not to have *too many orders* at once; but we hope to be kept continually supplied with work. The school was opened September 15, 1873, for the boys; but only till the last week have the ladies of the committee been able to devise any plan for the girls. November 10, this obvious want was supplied by obtaining a competent teacher to instruct the older girls how to cut and make dresses. The girls enter into the plan with great interest. There are sixteen scholars in all; viz., nine boys and seven girls. We have two teachers in the boys' department,—one for carpenter and jig-saw and turning work; one to teach cane-bottoming of chairs. There is one teacher for the girls."

"Our agent, Mr. Rose, is supervisor of the whole. The monthly salaries paid amount to $54. Besides this, necessary expenses for tools and articles needed for carrying on the business, have amounted to $196.74. These expenses have been met by prompt offers of some firm friends outside of the committee; and, doubtless, would continue to be so met in future, unless the stockholders think that the corporation should assume that duty, provided that all money expended for this purpose be drawn from any surplus remaining after paying the usual dividend to the stockholders.*

"The sewing school, which has been in operation for two years for the smaller girls, is still continued, and the pupils are improving in appearance and behavior, as well as in sewing. Children of Brookline have almost supported this work. After a time, we hope the children will learn to use a sewing machine, and have other occupations that may be deemed suitable and advantageous for them.

"Every two weeks the children have had their meeting for the five-cents savings bank deposits. Occasionally, on the same evening, we have had either reading of some tale or an exhibition of magic lantern, stereoscopic views, etc. The amount of deposits since January, 1871, up to November 1, 1873, has been $199.41. The interest accumulated from sums over $3 was, last year, $4.18. Each year, in the autumn, the amounts in bank of each depositor, with the interest that has accrued during the year, is read aloud to all, and in this report they seem to take the liveliest interest.

"At our first Christmas tree, this system of savings was commenced by giving to forty-nine children a bank book, each having a ten-cent deposit. The whole number of depositors from the first has been sixty-two. Twenty-nine may be said to be still depositing. The others have been careless about the matter, or, having moved away, have neglected it. Finally, the drunkenness of parents has prevented others from continuing their deposits.

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* The committee made no application to the stockholders for this purpose, the majority believing that the school should be sustained by voluntary subscriptions from friends. The committee, therefore, confidently appeal to the public, in aid of this excellent work. The expenses, at present, at least, far outbalance the receipts, and very probably always will do so, unless the instruction be carried on all day. The treasurer of the committee is Henry S. Grew, 89 Beacon Street.

"These twenty-nine have deposited $166.77 of the amount stated above, and have alone received all the above-named interest. The largest sum deposited was $32, by a young girl. The father fell ill, and is now dying of consumption, and this deposit has become, during his last illness, a real blessing to the whole family. Another, a boy, has deposited $29.53. Still another, $22.96. The number of depositors each evening varies from five to eight. We can not but hope that some thrifty habits are cultivated by this fortnightly meeting.

"During the year the children have had an excursion to Nantasket Beach, given them by invitation of the proprietor of the Boston and Nantasket Steamboat Company. Some of the older ones were invited to be present at the Warren Street Chapel festival at Music Hall.

"Flowers were distributed in the spring, and prizes were given in the autumn to children of several families for the best exhibition of plants.

"We had, at Christmas time, a Christmas tree, from which articles of usefulness were given.

"We have thus, as briefly and yet as comprehensively as we could, reviewed the work we have undertaken. We have seen the degradation of the whole building, and of its inmates, before we took charge. We have found a decided, though gradual, improvement. We look forward with great hope to the future. It may be said—we think with truth—that our attempt has met with a success that justifies us in asserting that *some one* should extend the same mode of operations until it includes all the vile tenement houses in the city. Here is truly a noble work to be done. It needs more laborers in it."

The East Canton Street estate consists of two blocks of 27 houses, three stories high, with the exception of five octagon front houses in the second block, which are four stories high. They contain 120 tenements and four shops.

The tenements are divided as follows: Six of one room, 36 of two, 45 of three, 34 of four rooms. The weekly rental is $417.60.

It is well to state, in this connection, that the trustees of the Lawrence estate have built three houses, five stories in height, opposite these blocks.

The secretary, Abby W. May, in her report dated January, 1876, says:—

"The past year, which has witnessed such great financial disturbances throughout our country, has brought a measure of loss to this company"; and that "among the first expenses to be curtailed is that of rent. If the working people can possibly put their families into smaller quarters, they do so; and they seek worse rooms than we furnish, if perchance the worse ones can be had at a lower price, which is not, by any means, always the case. So far as it has been possible or wise to be lenient in requiring payments, we have been so. But with all this, tenants have been obliged to leave us, and rooms have been vacant in all our houses. We have lost, in this way, hundreds of dollars, which in prosperous times would almost surely have been gained. Most of all have the hard times affected us injuriously in the sale of the houses built in Dorchester. Such houses are apparently needed, and the principle on which they are sold seems sound.

"Fifteen hundred dollars were lost from vacancies in the East Canton Street estate."

During the past year, the lease of the Crystal Palace, Lincoln Street, expired, and was not renewed. The report for the year ending December 20, 1876 (one year later than that given on page 92), shows that a 3 per cent dividend was paid in July. The January, 1877, dividend was passed, and $1,712 added to the Renewal Fund. The health record of the dispensary physicians places the Lincoln building at the head of a list of nine tenement houses in that neighborhood, some of which are occupied by a class of persons superior to the tenants in this building.

Why this commendable enterprise was termed co-operative, does not appear, unless the plan to provide cottages out of town was to partake of that feature. Other efforts in the latter direction have been repeatedly attempted, and some few companies formed for the purpose.

The Patrons of Husbandry

In this State are not known to have any distinctive features, and no data is at hand of the extent of their trade. Their method is largely of the club-order system. In some cases they act with other associations.

Sovereigns of Industry.

The latest organized attempt that we have to chronicle is that of the Sovereigns of Industry, a secret society, with ritualistic work, the first council of which was organized in January, 1874, at Springfield. The preamble to the constitution of the national council is as follows:—

"The laboring classes include the most numerous part of the people in civilized society, On their toils and worth the social welfare of society ultimately rests. Their redemption from wrong and suffering is of a corresponding importance. But thus far in history, their energies have been so absorbed, and their faculties so limited by their material task-work, and by their deprivation of the best opportunities for spiritual and social culture, that they have been very largely the passive servants of the social order devised for and imposed on them by the smaller, but more thoroughly organized portion of society, called the ruling classes.

"It is an unquestionable truth that the ruling spirit in civilized society is the personal and class pursuit of selfish interests. Accordingly, under the influence of this spirit, the aristocratic classes have monopolized privileges to themselves and thereby fastened on the working classes burdens which are unjust and unnecessary, and ought to be abolished. Therefore, knowing that in society as well as in nature the organized forces and elements appropriate and control the incoherent ones, that power is not only wielded but also engendered by union and co-operative exertion, we institute the Order of the Sovereigns of Industry, for the purpose of overthrowing these evils, elevating the character, improving the condition, and, as far as possible, perfecting the happiness of the laboring classes of every calling, and thus doing our part towards the redemption of the world. The order will aim to cultivate in its members generous sympathies, soundness of thought, comprehensiveness of policy, and a supreme respect for the rights of others, with an inflexible determination to maintain their own, while for labor it will seek to secure full and free opportunities.

"By all the wise and kindly measures it can command, it will present organized resistance to the organized encroachments of the monopolies and other evils of the existing industrial and commercial system. It will try to establish a better system of economical exchanges, and to promote, on a basis of equity and liberty, mutual fellowship and co-operative action among the producers and consumers of wealth throughout the earth.

"We wage no war with persons or classes, but only with wrongs, discords and hardships, which have existed too long. We most earnestly deprecate hatred, jealousy or envy between classes, and call on all people to be of one mind in the spirit of justice. We abhor every scheme of arbitrary agrarianism or violence, and shall use only such instrumentalities as are sanctioned by demonstrated principles of moral philosophy and social science, the universal interests of humanity, and a philanthropy rising impartially above all distinctions of class, sex, creed, race or nationality."

The following are the qualifications of membership :—

"SECT. 1. Any person engaged in industrial pursuits, not under sixteen years of age, of good character, and having no interest in conflict with the purposes of the order, shall be eligible to membership; and no distinction as regards rights and privileges of membership shall be made by this council, or by any state or subordinate council, on account of sex, creed, race or nationality."

The interpretation of this admits all but lawyers and politicians, though some councils refuse to admit traders.

The state council was organized in Worcester, April 21, 1874. Thirty-three councils were represented by 59 delegates, and a constitution adopted. At the second session there were 57 councils, with a membership of 3,564. At the first annual meeting, held December 8, 1874, there were 100 councils represented, with an estimated membership of 10,000.

At the next session, held in July, 1875, 153 councils had been organized, and 12,077 members were reported. Forty-eight stores had been started,—19 distributive, 18 co-operative, 11 unknown. Thirty-two reported a capital of $30,228, doing an average monthly business of $26,250.

At the second annual session 166 councils were reported, with an extended membership of 20,000. Number of stores not given.

The order in this State now numbers 98 councils, with an estimated membership of about 10,000. The following table gives the statistics of the stores now in operation under the patronage of the order. From the first to the fourteenth, inclusive, they are conducted on the council system inaugurated at Springfield. The remainder are on the joint-stock plan, with several methods of conducting business and dividing profits. The cash system is not strictly adhered to as a rule.

Store Statistics—Sovereigns of Industry.

TOWNS.	No. of Months in Operation.	Amount of Capital Invested.	Par Value of Shares.	No. of Shareholders.	Average Sales per Month.
Springfield,*	29	$6,800 00	$100 00	68	$11,500 00
Worcester,	15	400 00	†	†	600 00
Canton,	11	595 00	2 00	78	800 00
South Abington,	10	300 00	5 00	45	200 00
Spencer,	20	640 00	10 00	64	700 00
Attleborough,	13	1,000 00	-	-	2,000 00
Fall River,	10	90 00	-	-	290 00
Maynard,	4	108 00	3 00	36	300 00
Whitinsville,	9	300 00	5 00	16	50 00
Fairhaven,	11	100 00	-	-	100 00
Beverly,	16	600 00	-	-	1,800 00
East Dedham,	18	150 00	10 00	15	350 00
Fitchburg,	17	635 00	5 00	38	1,000 00
Kingston,	15	1,000 00	5 00	43	1,450 00
Groveland,	8	225 00	2 50	20	562 00
Woburn,	14	150 00	2 50	23	100 00

* Incorporated.

† Treasury fund.

Store Statistics—Concluded.

TOWNS.	No. of Months in Operation.	Amount of Capital Invested.	Par Value of Shares.	No. of Shareholders.	Average Sales per Month.
Dorchester,	13	$600 00	$5 00	23	$600 00
Lawrence,*	19	5,150 00	2 50	292	5,000 00
East Boston,*	10	1,300 00	–	200	3,500 00
Charlestown,*	15	1,068 00	5 00	55	475 00
Orange,	–	2,000 00	5 00	174	1,364 00
Saxonville,*	7	1,450 00	5 00	–	4,400 00
Stoneham,	12	315 00	2 50	86	265 00
Kingston,*	16	4,500 00	5 00	92	2,400 00
Chelsea,*	15	1,300 00	5 00	200	1,800 00
Cliftondale,	14	400 00	5 00	17	500 00
Milford,	5	400 00	5 00	33	1,000 00
Haverhill,	15	500 00	2 50	34	3,000 00
Clinton,*	18	3,240 00	5 00	140	3,700 00

Total capital invested,	$35,316
Average sales per month,	49,806

In addition to the stores enumerated in the table, there are others in the following places of which we have no statistics: New Bedford, East Douglas, North Billerica, Newburyport, Cambridgeport, North Easton and Reading.

Fifteen of these stores sell at less than usual rates. Seven without any profit, and 15 at the usual rates. Nineteen of them deliver their goods to the customers, and 17 do not. Twenty sell only to Sovereigns, 17 to any one. Eighteen of them have a capital less than $1,000; 11 of them of, and exceeding, that amount.

The method of doing business of this organization is, in a measure, similar to that adopted by the Labor Reform Association of 1864. Members are furnished with trading cards, good for three months. Contracts are made by the executive committees of the national, state and the subordinate councils, covering nearly every article in the household economy, at discounts varying from 5 to 50 per cent, the lowest being upon groceries, the highest upon sewing machines. Subordinate councils are furnished with confidential circulars, giving name and discount of the parties with whom contracts have been made.

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* Incorporated.

Tickets are good anywhere in the United States, at any house where contracts have been made. This system has been superseded, in many places, by an arrangement of club-order systems, and in some places the policy of the Fall River dividing stores, described in previous reports, has been adopted. In still other places joint-stock stores have been opened, at which members of the order are allowed equal discount with the shareholders. In others, a near approach to the Rochdale plan has been attempted.

But the most notable, and perhaps the most successful, is that adopted by the Springfield Council, and is as follows, as given under date of Springfield, September, 1874:—

"Each council shall receive subscriptions for stock from its individual members, and the moneys collected from the purchase of such stock, with the funds which the council will loan from its treasury, shall be placed in the hands of a receiver, to be selected by the council.

"The receiver shall pay over all moneys taken by him, into the hands of a board of trustees, taking their vouchers therefor.

"The board of trustees shall have the general management of the store, and, with the approval of the state executive committee, the appointment of an agent.

"The agent shall be placed under such bonds as the trustees may deem advisable.

"Hereafter, each council will be entitled to one delegate to a convention for choice of trustees, for every 200 shares which it shall hold of the stock.

"Nevertheless, every council holding shares will be entitled to one delegate.

"The price of shares shall be one dollar each, and any member is permitted to purchase a number not exceeding 100.

"Any member holding a share or shares, will be allowed interest, payable before dividends are declared.

"Any council wishing to withdraw its funds from the store, shall be allowed to do so, provided 60 days' notice shall first be given, and provided, also, that not over $200 may be withdrawn at any one time, and at intervals of one month each thereafter.

"The board of trustees shall be chosen annually, on the first Tuesday in October, and a call for such meeting shall be issued by the acting board of trustees, by the 15th September, same year; the call stating at what place the meeting shall be held.

"The board of trustees shall hold meetings at least once in each month, at which the receivers of the several councils may attend.

"The receivers shall be advisory members of the board of trustees, and will at all times be permitted to examine all papers relating to the store, and all transactions of the trustees and agent.

"The necessary expenses connected with the meetings of the board of trustees shall be considered as part of the expenses of the store, and paid therefrom."

The goods are sold at just such a margin above cost as will pay expenses; no dividends are expected or desired. Interest on the money, at 7 per cent, is added to the items of cost.

In addition to the organization of grocery and provision stores, mutual relief associations have been established in some few places. Attempts have also been made in the direction of a building fund association, and also to establish a wholesale grocery house in Boston.

The building association laid out a grand plan for co-operative towns. The constitution provides for the purchase of land, laying out of building lots, the erection of buildings by co-operation, and provides for the establishment of a bank for the purpose of enabling the members of the association to borrow money without paying an enormous percentage. The bank is to pay 6 per cent interest on all moneys deposited, and cannot charge more than 7 per cent on money loaned to any member of the association. All money left after paying the running expenses of the bank, is to be apportioned according to deposits. The members are equally secured by the constitution. It provides that in case any member can not meet his obligations, either from lack of employment or other causes, except drunkenness, the society is to pay him back, if desired, all money invested except interest, the same being left discretionary with the association. It has a clause that if a member dies and his widow desires to leave the association, she shall be paid back all moneys invested, with interest at 6 per cent. It also provides that no member can hold more than three lots or shares, and if he owns three he is compelled to build on one of them in one year's time from the date that he receives a warranty deed of the same. The shares are to be placed at $100 each, and can not be increased except by a two-thirds vote. It is estimated that each man will receive 8,000 feet of land, at a cost of about $100. The buildings can be put up by the quantity—six-room French cottage houses—at a cost of about $800 each; so for $900 or $1,000 a man has a house that can not be bought within ten miles of Boston for less than $2,000. The improvements will be made by the money obtained on premiums. There will, of course, be a number of lots that will be more valuable than others, which will be put up at a premium, and the man paying the highest premium will receive the title to the same. This enterprise must necessarily give work to a great number of men who are out of employment, and will benefit the workingmen in general. There need be no fear of want of railroad communication, for as soon as the population will warrant, a depot will undoubtedly be built.

The last method adopted for a concentration of trade is the formation of a "New England Sovereigns of Industry Board of Trade," whose objects and membership are as follows:—

"*Object.*—The object of the board shall be to promote direct co-operative trade or exchange among the councils and co-operative store associations organized under the auspices of the order of Sovereigns of Industry, or any other order which it may be deemed advisable by the board to admit to its privileges.

"*Membership.*—Membership of the board shall consist of not more than two representatives, chosen annually by the board of directors of each co-operative store company organized under the auspices of the order of Sovereigns of Industry; and of not more than two representatives of each local board of trade, consisting of not less than three councils; and of one representative from each council not represented in a board of trade, each of whom shall pay a membership fee of

$10; and of the president and secretary of each of the state councils, who shall be members *ex officio*."

Their method of concentration is as follows:—

The executive committees of subordinate councils, and the board of directors of Sovereigns' co-operative store associations, in each large town and city, are to organize and hold conventions for the purpose of organizing Sovereigns' co-operative boards of trade for their respective localities; each council or co-operative society represented in these boards to pay an entrance fee and such regular assessments as may be required to defray expenses. Reports are to be here made from the several associations as to the quantity and quality of goods of a given line which each association would want for any given time. These reports will be forwarded to the secretary of the state board of trade, and will represent the exact amount of goods in any line which would be required in each city or town.

The state boards of trade are to be composed of the executive committees, or representatives chosen from each of the local boards of trade, with headquarters in the chief commercial city of the State. The board of trade room to be fitted up for the reception of samples of goods which any importer, wholesale merchant or manufacturer might wish to offer for sale. The price per pound, parcel or other unit of measure at which the goods are to be sold for cash, to be marked on each sample, with the name of the firm or house sending the same. All samples of goods to be received by the secretary under rules made by the executive committee. The entire trade of the councils and local organizations of each State to be thus focalized and systematized, and placed in an accessible form before the wholesale dealers, would dispense, they say, with that questionable creature, a state purchasing agent.

The buyer for any Sovereigns' co-operative store may give his order to the secretary of the board, who will see the goods delivered; or, if the buyer prefer, he may go to the house himself and order his goods from the samples seen in the exchange. The necessary adjunct of the sample room, or exchange, will be the warehouse, in which goods for sale will be deposited at the owner's risk, to be paid for when sold, and not before; and after the warehouse, or in conjunction with it, will come the Sovereigns' wholesale co-operative store, the capital therefor furnished by the several associations and councils connected with the order.

The national board of trade to be organized by representatives from the state boards, and the executive committees of the state councils, acting in conjunction with the executive committee of the national council. By means of the national board of trade, the trade of the several states will be concentrated in the same way as the trade of subordinate councils and of local co-operative associations is consolidated and united through the state board of trade. The expenses of the state and national boards of trade to be defrayed by a small percentage on the goods bought by each council and store association.

As this organization was established so late in the year, no statistics of its operations can be given.

In addition to the organization of trade, the national council have published a paper in their interests, and issued tracts and circulars on the subject of co-operation, from one of which, an "Address by Hon. Amasa Walker," we quote:—

"1. There must be, as I have intimated, a permanent capital; though it be, as we have supposed, a small one.

"2. As I have before insisted, no credit must be given. The association must neither take nor give credit; if it does, the result will be unsatisfactory. '*Cash down,*' must be the motto.

"The *credit system* has ruined many associations, because it makes co-operation difficult and dangerous. Credit is the workingman's *greatest curse.* I say this deliberately and without reserve. By this I mean that he suffers more from the practice of taking credit upon what he consumes, than from anything else outside his own personal habits. A man may purchase a house on credit, if he will, because it is fixed capital. He does not consume it. He has it permanently on hand, and by the use of it is able to lay up a greater amount of his annual earnings; but he should never take credit upon anything for daily consumption.

"3. A profit must be charged upon all sales, to meet necessary expenses; and it should be large enough to guarantee against all accidents; since, if there is more than sufficient for that purpose, the balance that may have accumulated at the end of the year can be divided among the stockholders, or added to the working capital. A margin should always be provided.

"4. Again, economy should be consulted in the choice of a room for the business and in the help required to carry it on. This is one of the striking advantages of co-operation,—nothing need be expended to entice custom. So that the location is central, and the room sufficiently large and convenient, it matters not whether it has plate-glass windows, frescoed ceilings or rosewood counters. No matter how simple and inexpensive—the more so the better; for all saved in this way accrues to the profits of the associates.

"Associations often fail for want of economical management of their affairs. The great object being to save money, all unnecessary expense or waste must be carefully avoided.

"5. Pure, unadulterated articles alone should be furnished. This is an important object.

"6. And lastly, but not least in importance, the assistance of the fair sex."

Nothing has been done by the state organization in the direction of agitation. A paper published by individual enterprise has been in existence some two years.

The national council, in their declaration of purposes, say:—

"The order is an association of the industrial or laboring classes, without regard to race, sex, color, nationality or occupation; not formed for the purpose of waging any war of aggression upon any other class, or for fostering any antagonism of labor against capital, or of arraying the poor against the rich, but for mutual assistance in self-improvement and self-protection. It demands such equity as shall guarantee to every producer of wealth, whether he labors with brain or muscle, his proportionate share of that wealth. The wages of all classes of mechanics are in a great measure regulated by the demands of the middle-men who control the price of the wares manufactured. By exacting exorbitant commissions, these agents compel the manufacturers to cheapen the cost of production in order to secure a fair profit to themselves, and the burden necessarily falls upon labor. Our system aims to bring the producer and consumer in close business relations, thus enabling the manufacturers to fairly recompense their workmen. We do not war against manufacturers, but against the pernicious system of trade now in vogue, which not only injures them, but, in most instances, depreciates the wages of the workman.

"The order opposes the system of credit, by which the poor man is often led to purchase that which he would do without if he were called upon to pay as he goes, and is thus tempted to anticipate his earnings, and often to incur debts which he can not pay. Under this system the dealer is forced to increase his profits, that he may be able to bear the loss, thus virtually making the honest buyer pay for the goods which are consumed by those who are too poor, idle, extravagant or dishonest to pay their debts. It would unite its members in such fraternal bonds as shall hold them to a supreme respect for the rights of others, and sympathy for the distress of those more unfortunate than themselves, and also to co-operate with one another in the advancement of such objects as are best calculated to elevate the character, promote the interest and improve the intellectual, moral and physical condition of the human race."

In another circular they say that two prominent features in this movement are plans for education and culture, and for securing pecuniary advantages to its members. No methods for securing education or culture have as yet been adopted.

As in the New England Protective Union, the whole force of the order has been turned to matters of trade. In the records of the proceedings of the state council and circulars issued by the national council, hints are given of higher purposes and more important work, but no action has been taken.

In the report of the committee of the state council on abstract of proceedings, they say:—

"In accordance with the vote passed at the special session held at Worcester, September 2, 1874, your committee respectfully report the following abstract of proceedings and digest of laws, giving the full title to what it is hoped will prove a record of harmonious deliberation, and a digest of such wise legislation as shall ensure to the masses a unity of purpose and of action, not only in the saving of a few cents from our wages, but in so increasing the purchasing power of a day's work, as shall make manual labor as pleasurable and profitable as that of the merchant and lawyer."

The executive committee, in their report, say: "From a condition of selfish isolation the masses are awakened to the importance of combination and unity of interests. Slowly, yet surely, we are learning the lesson of co-operation. The antagonism and jealousy that naturally come from narrowed opportunities, are giving way before the increased intelligence that comes from organization. If we are but true to each other, considerate in action and wise in judgment, our order will soon embrace in one solid phalanx a united and intelligent people, able to cope with and conquer the evils of their present condition, and become partakers of the bounty of which they are now but the producers.

"Brothers: upon you depends the success of the order. United we stand, divided we fall! Our duty is plain. By the victorious power of combination we can not only command the processes of the distribution of all commodities, but the distribution of wealth by natural and legitimate processes; so that the producer shall receive for his labor all that legitimately belongs to him, rather than as now, allow it to be used by the present wasteful system of wage labor by employers, traders and speculators."

In the concluding paragraph, as will be seen, they foreshadow co-operative production. In the report of the state secretary of the order, dated January 19, 1876, he says:—

"If one word can explain the source of all our disagreements, it may be called ignorance. Meeting together but seldom, with little opportunity for communication, our state council sessions have seemed but a babel of tongues, during which the building of our stronghold of resistance against impending danger has been stayed. Watchful against each other, instead of for each other, has seemed to be the method of our action.

"The past is behind, the future before us. What will you do with it? In warning and entreaty, let me urge you to put aside the spirit of envy and uncharitableness, and to take on the spirit of true co-operation, a spirit that shall lead to the discussion of the causes of our poverty, that shall not satisfy itself with petty expedient, that shall mean a union of the wage and suffering classes in an unbroken phalanx,—before whose onward march, want, ignorance and crime shall disappear, and in their place, plenty shall flow, true culture, love and virtue rule."

As farther information upon the method, success and failures of some of these Sovereign stores, we give the following extracts from letters received:—

"There are three attempts at co-operation in Kingston, all giving promise of full success.

"*First.*—Silver Lake Co-operative Association, with store at Plympton Station.

"This commenced business July 1, 1875, with a capital of only $430, in shares of $5 each, held by Sovereigns of Industry. The number of shares per shareholder can not exceed 50. The buying and selling is strictly for cash. All sales at fair cash rates for the vicinity. The rate of interest on shares fixed. A sinking fund or surplus, which may accumulate to 30 per cent as large as the capital, provided for. Interest allowed on undrawn dividends; net profits divided among patrons in proportion to the amount of their purchases. Stock redeemable and dividends payable on demand.

"Amount of capital at the present time, $1,200, held by about 45 individuals. Sinking fund or surplus, about 20 per cent as large as the capital. Amount of business done per annum, about $15,000, and increasing.

"The trade from outside of the association exceeds largely that of the members.

"The interest now paid to shares is at the rate of 8 per cent per annum, and on undrawn credits at the rate of 6 per cent. The dividends to patrons is 4 per cent on the amount of their purchases.

"The expenses, all told, are about $76 per month.

"*Second.*—Old Colony Co-operative Association Store, Kingston Village. It has been in operation nearly two years, doing business now at the rate of about $30,000 per annum, on the Rochdale plan. Shares $5, and limited to 40 to an individual.

"It pays 8 per cent on its stock, and divides at present 2 per cent to patrons on the amount of their purchases. It is deemed a success.

"*Third.*—Kingston Co-operative Foundery Company, in Kingston, near North Plymouth.

"It was organized recently as a corporation, by workmen, who will hold most of its capital of $8,000. Its shares are $100, and the number to any individual limited to 10.

"It is proposed, as soon as possible, to increase the capital to $15,000. It will be ready for active operation on or before April next. It will have as members mostly picked men from other founderies, and it gives great promise of success.

"*Brookfield.*—The Sovereigns of Industry commenced a store in this town, May 1, 1875, and closed August 1, 1876. Commenced with about 30 members, and closed with about the same, and sold only to members, with profit only to cover expenses. Store open twice a week, in the evening. Each stockholder was limited to one share of $10. The cash system was adhered to. The cause of closing was, the treasurer could not attend to it, and no one else would. Besides, some were scared because the last quarter's sales were small, and they thought they were losing. But, in fact, the shares were at par, and paid 7 per cent besides. Most of them are sorry that it was allowed to close up."

A correspondent from Easthampton writes:—

"He joined with some 20 others and formed a club for the purpose of giving their united custom to the storekeeper who would give them the largest discount on goods. The best offer they received was 13 per cent, which they accepted. This continued for some six months, but the demands of other customers for the same advantage, and the yielding of the storekeeper in some cases, produced general dissatisfaction, and the arrangement was abandoned.

"They then formed a council of the Sovereigns of Industry, but found that, as they could only purchase certain kinds of goods at reduced rates, it was not worth while to continue, and finally resolved on a co-operative store on the dividend plan, as in England. This worked well until their prices were made public, and the storekeepers were able to undersell in some articles, and so took their trade. Sales fell off almost half, without corresponding reduction in expenses. This resulted in a loss which was seriously felt by the really interested members.

"They decided to mark up goods to town prices and reduce expenses. The following quarter they were able to pay a dividend of 10 per cent on all purchases, and make up part of previous loss.

"This had the effect of bringing back some of the members that were falling off; and they hope by a continuance in the same direction to make their store a success.

"They find one difficulty of the cash system to be in the system of monthly payments for labor, and have been forced to give credit to the extent of half the value of share-money."

Saxonville.—A correspondent from this place writes:—

"We commenced business with about $1,100. We deal in groceries and meat, employ a head storeman, butcher, teamster and cashier. We have been able from the first to do a large business; have sold lower than others. We sell to any one, though outsiders have no inducement to trade, for they get no dividend. Still our trade is one-third from that source. In the first quarter the directors declared one and one-half per cent dividend on purchases; on the second quarter, three and one-half. The report for last quarter has not yet reached me. We are doing business to the amount of $4,000 per month, and if our members will only have as much patience with it as they have in dealing with others, there is not a shadow of a doubt but it will be a success in spite of all the disadvantages under which we have had to labor. The capital is now little over $1,700."

Miscellaneous Co-operative Enterprises.

In addition to the stores under the management of the Sovereigns of Industry, there are numerous others under different forms of management.

We give herewith a table of such as have been chartered, but have made no report to the secretary of state for 1875. It will be seen that many of these also are Sovereigns' associations. We give them in this table, as no report of them was made to the secretary of the order.

NAME.	Localities.	Production or Distribution.	Year of Charter.	Amount of Capital.	No. of Shares.
Boston Co-op. Savings Co.,	Boston,	Dis.,	1875,	$1,000	200
Benj. Franklin Co-op. Council S. of I.,	Lawrence,	"	1875,	2,000	800
Clinton Co-op. Association,	Clinton,	"	1875,	3,000	600
Co-op. Ass'n S. of I., No. 76,	Lawrence,	"	1875,	5,000	2,000
Crispin Co-op. Company,	Lynn,	-	1871,	3,000	-
Farmers and Mechanics' Co-op. Association,	Athol,	Dis.,	1876,	1,000	20
Gosnold Workingmen's Co-op. Association,	New Bedford,	-	1871,	3,500	-
Hampden Co-op. Association,	Westfield,	Pro.,	1870,	4,000	-
Industrial Co-op. Association,	New Bedford,	Dis.,	1876,	2,500	250
Labor Journal Co-op. Pub. Co.,	Fall River,	Pro.,	1870,	5,000	1,000
Lechmere Distributive Ass'n,	East Cambridge,	Dis.,	1875,	1,000	200
Lowell Co-op. Home Co.,	Lowell,	Pro.,	1871,	20,000	-
Lowell Co-op. Ass'n S. of I.,	Lowell,	Dis.,	1876,	1,010	202
Lynn S. of I. Co-op. Ass'n,	Lynn,	"	1876,	1,000	200
Marlborough Co-op. B. & S. Co.,	Marlborough,	Pro.,	1876,	10,000	1,000
Natick Co-op. Store,	Natick,	Dis.,	1876,	1,000	100
North Brookfield Co-op. Ass'n,	N. Brookfield,	"	1875,	1,000	200
Orient Co-op. B. & S. Co.,	Marlborough,	Pro.,	1876,	2,000	20
Patrons and Sovereigns' Co-op. Association,	Westfield,	Dis.,	1876,	3,000	300
Southbridge Co-op. Association,	Southbridge,	"	1876,	1,000	200
Sagamore Co-op. B. & S. Ass'n,	Lynn,	Pro.,	1872,	2,000	-
Sovereigns' Co-op. Company,	Salem,	Dis.,	1876,	1,000	200
Sovereigns' Co-op. Association,	Webster,	"	1876,	1,500	300
Sovereigns' Co-op. Association,	Worcester,	"	1876,	1,000	200
Sovereigns' Co-op. Union,	East Boston,	"	1875,	1,000	1,000
Sovereigns' Co-op. Association,	Shelburne,	"	1876,	1,000	200
Sovereigns' Co-op. Store,	Taunton,	"	1876,	1,200	240
South Hingham Co-op. Ice Co.,	Hingham,	Pro.,	1872,	1,000	-
Truro Co-op. B. & S. Co.,	Truro,	"	1873,	2,100	-
Union Co-op. Gas Association,	Weymouth,	"	1872,	1,000	-
United Neighbors' Co-op. Ass'n,	Abington,	Dis.,	1876,	1,000	200
Westborough Co-op. Milk Co.,	Westborough,	Pro.,	1871,	1,000	-
Westfield Co-op. Store,	Westfield,	Dis.,	1871,	2,250	-

In contrast with this table, which is to some extent a table of failures, we give a table of those that have made returns for the year 1875. Many of these are productive experiments. How far they are co-operative, does not appear.

The most remarkable success is that of the Somerset Co-operative Foundery, an account of which is given further on.

Assets.

ASSOCIATIONS.	Localities.	Year of Charter.	Production or Distribution.	Capital paid in.	Real Estate.	Land and Water Power.	Buildings.	Machinery.	Other Assets.	Cash and Debts Receivable.	Manufactures, Materials and Stock in Process.	Miscellaneous.
Acushnet Co-operative,	Acushnet,	1867,	–	$6,900	$4,000	$1,000	$3,000	–	$6,929	$1,008	–	–
Boston Co-operative,	Boston,	1873,	Pro.,	4,000	–	–	–	–	–	7,413	$3,431	$1,229
Chelsea S. of I. Co-operative,	Chelsea,	1875,	Dis.,	814	–	–	–	–	397	–	634	–
Co-operative Mutual Homestead Co.,	Chelmsford,	1874,	Pro.,	4,000	9,000	3,000	6,000	–	4,000	2,400	–	1,600
Essex Co-operative B. & S. Co.,	Lynn,	1872,	"	4,000	–	–	–	$1,463	–	5,953	2,193	35
Eastern Co-operative,	Westfield,	1874,	"	4,500	–	–	–	–	–	5,280	2,015	262
East Abington Crispin Co-operative,	E. Abington,	1869,	–	–	–	–	–	–	–	–	–	–
East Templeton Co-op. Chair Co.,	E. Templeton,	1872,	Pro.,	15,000	–	–	–	9,720	–	8,010	11,078	3,434
Fall River Workingmen's Co-op.,	Fall River,	1867,	Dis.,	17,026	25,000	–	–	3,935	–	4,024	8,391	581
Fall River Co-operative Building,	Fall River,	1874,	Pro.,	6,000	6,887	737	6,150	–	–	–	–	–
First Worcester Co-op. Gro. & Prov.,	Worcester,	1867,	Dis.,	5,000	–	–	–	–	5,233	4,761	–	–
Fitchburg Co-operative,	Fitchburg,	1867,	"	1,880	–	–	–	–	–	–	–	–
Gardner S. of I. Co-operative,	Gardner,	1875,	"	1,800	–	–	–	–	2,230	1,341	–	129
Massachusetts Cigar Makers' Co-op.,	Westfield,	1873,	Pro.,	7,000	–	–	–	–	–	9,790	5,595	332
Middlesex Co-operative B. & S.,	Stoneham,	1875,	"	10,000	–	–	–	2,159	–	8,193	3,897	–
Mount Tom Co-operative,	Holyoke,	1875,	"	2,050	–	–	–	–	–	364	2,565	228
Monument S. of I. Co-operative,	Boston,	1875,	Dis.,	650	–	–	–	–	650	–	–	–
Natick Protective Union,	Natick,	1868,	"	6,000	–	–	–	–	7,919	1,800	6,111	–
National Cigar Makers' Co-operative,	Westfield,	1875,	Pro.,	2,100	–	–	–	–	–	2,501	2,420	237
Old Colony Co-operative,	Kingston,	1875,	Dis.,	1,820	932	–	932	–	–	216	2,778	50
Pioneer Co-op. Building Society,	Fall River,	1872,	Pro.,	5,890	5,455	955	4,500	–	–	182	–	–
Phœnix Cigar Co-operative,	Westfield,	1875,	"	3,500	–	–	–	–	8,772	4,772	4,000	–
Stoneham Co-op. Shoe Company,	Stoneham,	1878,	"	10,000	–	–	–	1,762	–	9,130	5,228	534
South Abington Workingmen's Co-operative Grocery and Provision,	S. Abington,	1870,	Dis.,	2,025	–	–	–	–	–	7,775	2,667	–
Somerset Co-op. Foundery Company,	Somerset,	1868,	Pro.,	30,000	11,400	–	–	–	–	3,342	16,140	17,542
Stoneham Co-operative Union,	Stoneham,	1873,	"	3,310	–	–	1,700	–	–	83	3,760	965
Sovereigns Co-operative Company,	Springfield,	1875,	Dis.,	6,000	–	–	–	–	10,510	–	1,753	2,000
Wenham Co-operative Union,	Wenham,	1870,	"	5,000	5,978	905	5,028	–	–	6,463	–	2,675
Westfield Cigar Makers' Co-operative,	Westfield,	1871,	Pro.,	1,350	–	–	–	–	–	2,520	1,418	228
Westborough Co-operative Union,	Westborough,	1872,	Dis.,	3,850	4,600	1,600	3,000	–	–	3,447	4,031	–

Liabilities.

ASSOCIATIONS.	Localities.	Capital Stock.	Debts.	Reserves.	Balance, Profit or Loss.	Reserve for Depreciation.	No. of Shares.
Acushnet Co-operative,	Acushnet,	$7,000	-	$5,037	-	-	276
Boston Co-operative,	Boston,	4,000	$6,316	-	$1,739	-	12
Chelsea Sovereigns of Industry Co-operative,	Chelsea,	1,000	55	5	161	$16	178
Co-operative Mutual Homestead Company,	Chelmsford,	4,000	5,000	-	-	4,000	40
Essex Co-operative Boot and Shoe Company,	Lynn,	4,000	5,881	-	-	-	8
Eastern Co-operative,	Westfield,	4,500	6,906	-	-	-	10
East Abington Crispin Co-operative,	East Abington,	2,500	-	-	-	-	-
East Templeton Co-operative Chair Company,	East Templeton,	15,000	17,242	-	-	-	150
Fall River Workingmen's Co-operative,	Fall River,	25,000	13,129	-	1,145	10,630	1,690
Fall River Co-operative Building,	Fall River,	6,000	-	-	411	-	-
First Worcester Co-operative Grocery and Provision,	Worcester,	5,000	4,354	-	-	-	1,000
Fitchburg Co-operative,	Fitchburg,	1,380	588	-	-	-	260
Gardner Sovereigns of Industry Co-operative,	Gardner,	1,800	1,799	-	101	-	-
Massachusetts Cigar Makers' Co-operative,	Westfield,	7,000	7,148	-	-	1,803	10
Middlesex Co-operative Boot and Shoe,	Stoneham,	10,000	4,244	-	8	-	40
Mount Tom Co-operative,	Holyoke,	4,000	1,107	-	-	-	82
Monument Sovereigns of Industry Co-operative,	Boston,	1,000	-	-	-	-	180
Natick Protective Union,	Natick,	6,000	-	1,800	-	119	600
National Cigar Makers' Co-operative,	Westfield,	2,100	2,772	-	286	-	7
Old Colony Co-operative,	Kingston,	2,000	2,187	-	422	47	264
Pioneer Co-operative Building Society,	Fall River,	6,000	-	-	427	-	589
Phœnix Cigar Co-operative,	Westfield,	3,500	4,118	-	1,159	-	7
Stoneham Co-operative Shoe Company,	Stoneham,	10,000	5,896	-	258	534	40
South Abington Workingmen's Co-operative Grocery and Provision,	South Abington,	2,025	7,521	173	723	-	405
Somerset Co-operative Foundery Company,	Somerset,	30,000	10,600	28,824	6,000	-	300
Stoneham Co-operative Union,	Stoneham,	4,000	2,873	-	211	64	331
Sovereigns Co-operative Company,	Springfield,	7,000	8,224	-	39	-	60
Wenham Co-operative Union,	Wenham,	5,000	9,418	-	538	-	500
Westfield Cigar Makers' Co-operative,	Westfield,	1,350	7,222	-	4,397	-	9
Westborough Co-operative Union,	Westborough,	8,850	3,000	-	228	500	236

The following is a list of titles of companies to whom charters have been granted; some have never made reports to the secretary of state, and others probably have never organized for active work. We have no recent reports, and know nothing of their present status:—

Cigar Manufacturers' Co-operative Association, Westfield,	1871
Co-operative Mill, Fall River,	1867
Gardner Co-operative Association, Gardner,	1868
Holyoke Co-operative Association, Holyoke,	1870
Hopkinton Co-operative Association, Hopkinton,	1870
Howard Co-operative Company, Lynn,	1871
Irish-American Leader Printing and Publishing Co., Boston,	1872
North Adams Co-operative Shoe Company, North Adams,	1870
Sandwich Workingmen's Co-operative Association, Sandwich,	1867
Shoemakers' Co-operative Company, Lynn,	1871
South Reading Co-operative Association, Wakefield,	1867
Springfield and Newburyport Mining Co-op. Asso'n, Newburyport,	1875
Union Cigar Makers' Co-operative Association, Westfield,	1869
Union Grocery Co-operative Association, Weymouth,	1872

One of the most successful co-operative distributive associations in the State is that of the Natick Union Store. Others may have done a larger amount of business, but none have seemed to be so purely co-operative.

This store was chartered December 10, 1866, as "The Natick Protective Union." The capital stock was $2,000, divided into 200 shares of $10 each. The system, in brief, is as follows: Sales and purchases to be always for cash; goods to be sold at the lowest prices consistent with safety; stockholders to have a discount of 5 per cent from the price set; a good quality of goods to be kept.

The company, not being permitted to own any real estate, rented a suitable place, which it still occupies, and opened the store December 28, 18 days after being organized.

The semi-annual dividend has always been ready promptly. In October, 1868, more than $2,000 had been accumulated; and as the store needed $4,000 capital to do the business with, it was decided to make a dividend to every shareholder of a new share instead of $10 cash.

In January, 1872, $4,000 were divided, giving a cash dividend of $10 a share. At the annual meeting of 1874, $2,000 more were divided, giving $5 to every share, and still leaving an undivided surplus.

January 1, 1875, there was paid a dividend of $10. At this time the capital stock was increased 200 shares, making the entire capital $6,000.

January 1, 1876, there was paid a dividend of $4. Total amount of dividends paid to each share, $39. Six per cent per annum has been paid on the capital, as required by law, and also the amount of sinking fund has been set aside, as required by law. Total sales for 1876, $120,000.

Groceries, meat, vegetables and fruit are the kinds of goods bought and sold. The first cent's worth of credit has not yet been given. Quarterly meetings are held in January, April, July and October, at each of which a full statement of the condition of the association is given. At the January meeting officers are chosen. They consist of president, secretary, treasurer and three directors. The president, treasurer and directors constitute what is called a board of managers.

As the most successful case of co-operative production, we give (from a correspondent) the following brief account of—

The Somerset Co-operative Foundery Company.—"This company was organized October 18, 1867. We lost money up to the 1st of January, 1869. Since then we have paid dividends to stockholders, $14,600, and added to our surplus fund, $30,800. Our stockholders number 53, of whom 29 work for the company. We pay no dividends to our customers.

"Wages paid are better by 25 per cent than in any other shop in New England, and 50 per cent better than the average. We did not take any stockholder at first, unless he took five shares. We have had a good class of men, and the amount they put in has held them together. But if we had not made money, I do not think it would have been possible to have kept them together. We have had very little trouble, and only a few of the original stockholders have sold out.

"The assets and liabilities are as follows:—

Assets.

Manufactured stock,	$10,523 00	
Unmanufactured stock,	5,617 00	
Tools and fixtures,	4,242 00	
Flasks and patterns,	12,300 00	
Cash and notes,	2,533 00	
Outstanding bills,	29,368 00	
Real estate,	11,400 00	
		$75,983 00

Liabilities.

Capital stock,	$30,000 00	
Surplus fund,	27,824 00	
Notes at bank,	5,000 00	
Other liabilities,	5,600 00	
		$68,424 00

"January 1, 1876, we added to surplus fund, $3,000, and paid dividend of $3,000 cash."

A few more examples of successes and failures are here given.

Fitchburg.—A correspondent says:—

"There were two union stores in Fitchburg previous to any attempt at co-operation, in which I was personally interested, and as far as I can learn, the cause of their death is the same in common with the death of another; viz., lack of knowledge of the business, lack of interest in the business, and a failure to do the duties of managers by the managers. As far as I can learn, both efforts went out of existence with the taint of dishonesty resting on some of the managers.

"The next attempt at co-operation was the organization of the Fitchburg Co-operative Grocery Store, November 14, 1864, with a capital of about $600, which was increased to $1,400. At one time dividends were paid on the amount of trade by each member, interest of 6 per cent being paid on the stock. Shares were first fixed at $10, and afterwards reduced to $5, no member having the right to hold over $50 in stock. Annual dividends on trade were paid, ranging at different times from 2 to 7 per cent. The amount of trade per month ranged from $1,000 to $3,100. The greatest number of shareholders at one time was 120. The cash system was adhered to the first few years, after which the head clerk was allowed to give credit at his own risk. Goods were bought on credit.

"The last of March, 1873, the concern failed with liabilities of over $6,000, and assets of about $2,400; the cause of the failure being the same as in previous efforts of the same nature."

The Andover Co-operative Association organized as a protective union, and ran about sixteen years. Generally successful. It was started, mostly, by the hacklers, in Smith and Dove's flax mill. They were mainly Scotch, English and Irish in nationality. Semi-annual dividends averaged about 9 per cent. Shares were $10. No one was considered a member unless he owned seven shares. The old system was, of retaining all the profits until full membership, and a written notice of one month to draw money required.

A member under the new organization can own ten shares. None but workingmen own shares or patronize the store. It is open three nights in a week. Sell at about the same price as the best store in town. Take account of stock once in six months. Customers take home their own goods. There are about 40 members. Capital stock, $2,300. They buy on 30 days and sell on 30 days. Have lost but little. A new customer has to be approved by the committee of management; a new committee is generally elected every year. They have three salesmen; pay them 22 cents an hour when on duty. Committee meet twice a month, and there is a general meeting twice a year. They meet in the school house.

A portion of the profits are reserved for a sinking fund. The store is open from six to eight o'clock, P. M., Tuesdays, Thursdays and Saturdays.

There is a good deal of change in the trade. No limit to the number of shares.

There have been five attempts at co-operative storekeeping in Haverhill. First, the "New England Protective Union"; second, the "Union"; third, the "Music Hall Union"; fourth, the "Crispins"; fifth, "Sovereigns of Industry."

The second started November, 1862, with 65 shares and 30 shareholders; par value of shares, $5. Most of the capital taken to furnish the store. The president loaned $800, taking a grab mortgage. For three years an average dividend of 14 per cent was paid, and an average trade of $60,000 a year. Storekeeper's salary was $1,000. He was the president of the association. There was no limit to the number of shares. Credit was given to any one recommended by the directors or persons employed in the store. The store was closed up in February, 1866. There were $700 due the store, principally from stockholders. Great deal of feeling grew out of closing up, the president claiming to have lost considerable money, and the stockholders making the same claim. The last year of the store was a losing one; the expenses were not reduced; the stock had increased to $4,400. No account of stock was taken. A new agent had been appointed the first of the last year, and the wholesale grocers refused to give credit. This embarrassed the store, and caused depreciation of stock.

The "Crispin" store started in 1872, and continued four months. Capital stock, $2,820—$1,400 paid up. Balance never paid. Par value of shares, $5. Directors were elected by stockholders, the latter choosing the agent. No invoice was kept. The association paid creditors in full. They were all shoemakers, and mostly Americans. Bought for cash.

The store of the "Music Hall Union" was held by men of means. This store succeeded in reducing prices, and closed up, paying all bills. It was not a financial success.

"The 'South Abington Workingmen's Grocery and Provision Association' was organized February 14, 1870, with a capital stock of $1,060. The number of shares at that time was 212, held by 68 members. Goods have been sold from its commencement to the date of January 15, 1876, on credit. The profits were divided not on the shares, but on the amount of goods purchased, which was about $2.50 to $1,000 worth purchased. Eight per cent interest has been paid on the capital stock. This has been increased from time to time, until the amount is now $2,025. No limit has ever been made to the number of shares held by any member, save the statute limitation to $1,000 for one shareholder. The number of shares in our store is now 405, held, I believe, by 96 members. One person holds 40, another 20, and nearly all the rest two shares each.

"The store did very well the first four years of its existence, but the management during the year 1874–75 trusted out goods without good judgment being exercised, and the store found itself at the close of 1875 with about $8,000 in bad bills. At that time we were in debt to Boston parties to the amount of $10,000. So we were about $3,000 behind what we should have been.

"Previous to these two years, we had paid a dividend every year to shareholders on their amount of purchases, as stated above. The last two years we have paid no dividends. At the commencement of 1876 the creditors began to press us for payment, and there was a compromise effected by which a settlement was made, the association paying 35 cents on the dollar.

"So it may be said that we have failed, in a measure, in our attempt at co-operation, partly through mismanagement and partly through the credit system; my judgment is, as much through the latter as the former.

"Our form of management has been by a board of directors of five, with the addition of the president, secretary and treasurer. Our treasurer has always been our chief storekeeper, buying and selling all goods, with such help as he needed to assist him. The store adopted the cash system, January 15, 1875, and has adhered to it ever since, but has hardly paid its way.

"The condition of the store at the time of its settlement with the creditors was such as to awaken a great deal of discord and distrust, which has grown rather than diminished, and where there is a want of harmony, it is very difficult to make co-operation a benefit or a success in any degree. We have many men among our shareholders who are ignorant, knowing nothing of business management, and a few who seem to have souls no larger than an old-fashioned three-cent piece. It takes almost a lifetime to beat a noble idea into such men's heads. Ignorant and selfish men are not the men to manage co-operation and make it a success.

"Our store is now in operation, but I do not think it will be very long after the annual meeting, which takes place on Wednesday evening, January 10.

"There seems to be a pretty strong feeling that it should close up, rather than run behind any more. This is the feeling among many of the shareholders, and when they refuse to give it their hearty support, and make the sacrifices which will always be necessary to the success of the principles of co-operation, especially in its infancy, *it must fail.*"

Conclusions.

It appears, from a careful review of the past, of which this article is but a brief outline, that there has been for the past twenty-five years in this State an annual investment of from one hundred thousand to a quarter of a million of dollars in co-operative experiments; that the average duration of their existence, omitting such as have had but a normal life, has been from about three to five years.

It has been shown that they have their origin in the most benevolent and statesmanlike motives,—the good of the human race. The founders in most instances are what Holyoake calls "world makers,"—men who believe in the golden rule and the golden future.

To these Utopians, the little grocery store is arrayed in the magnificence of their own imaginations, to assist in the management of which is to govern the empire in its infancy.

The men who distributed the box of soap and half-chest of tea, in 1845, felt that they were bringing the tea-grower and the soapmaker into closer relations, thus stimulating America and civilizing China.

They, like their co-workers in Rochdale, sought the solution of the labor problem.

The American pioneers of the protective union were the men who were agitating for ten hours, the institution of lyceums or institutes, for making the militia system less burdensome to the laboring classes, for legislative regulation of factories, education for all, abolition of imprisonment for debt, the adoption of a national bankrupt law, the extension of the right of suffrage, the enactment of a mechanics' lien law, the abolition of capital punishment, slavery and war.

They organized and worked. They called conventions, wrote appeals, published tracts, weighed out justice and sugar with even balances, and measured men, government, and cotton cloth by the golden rule.

Their weekly meeting was the oasis in the desert of their lives; for there, in their upper room, they discussed the affairs of State and the affairs of their union, the tariff and the price of tea (many of them were free-traders), cotton cloth, slavery and the excessive hours of labor.

With the increasing cares of the organization and of their families, the lesser overcame the larger. Tea was discussed more and tariff less. Men joined the store who never attended the meeting, or cared for aught but low prices and large dividends. Then other stores were started whose meetings were wholly for business purposes, the electing of a storekeeper, and the needed committees. The selfish became the majority. The Utopians were retired from the command, and the store that seemed a portion of the coming kingdom became the arena for a competition that never scrupled at a trade that would bring dividends.

For a time the New England Protective Union was a financial success, though the trade of the members was never wholly, or in great part, concentrated. Its failure to carry out its grand mission, as set forth in the preamble to the constitution, was the secret of its utter failure. Failing to extend its operations, it limited them.

At its origin, it held the principle of each to help the other, and ended with that of each to help himself. It is not surprising that, in many cases, the storekeeper having more time and opportunity than the rest, often profited by their example, and, at last, helped himself to the sole control.

This experiment demonstrated that a number of men could unite and buy goods at wholesale, and distribute them at less cost among each other, than under the old system; and it further demonstrated that they could not co-operate to make that fact of any use to themselves nor to posterity. More was done by the score of men who started the organization, and their few dollars, than was done when the members were numbered by thousands, and the dollars by hundreds of thousands. The annual conventions were as well, or better, attended when the division numbered less than two hundred than when they numbered upwards of six hundred.

The separation of the organization into two branches, in 1853, was, in brief, a failure to co-operate. As long as the members were personally agreeable to each other, and there was no conflict of authority, they co-operated. They failed just where their system was strongest and they were the weakest.

That the war finally destroyed the last vestige of the stores, was but natural. The uncertainty of prices at that period frightened the stockholders, and they gladly sold to the storekeeper, who was willing to risk something for the sake of continued occupation. For years before its demise, it was nothing more than a joint-stock enterprise, in which the stockholders cared little for the—

"Dividends of comfort bringing"

to any but their own household.

As with this experiment, so with the others. In their inception they were managed by men energetic and disinterested, willing to work, but not always ready for the martyrdom that such efforts demand. When risk or loss was the rule, and dividends an unknown factor, co-operation was easy. But with success came the selfish, who, as Holyoake says, risk nothing in the early struggle, "But as soon as the sunshine of success warms up the scheme, the envies and jealousies crawl out like parasites, and in some places where human nature is worse than in others, they overrun everything, and make the society morally uninhabitable."

There is such a similarity in the oft-repeated story of their failures, that one or two examples will do for all. The name of the places are omitted from the recital to avoid seeming personality.

A store was started in ——, with a capital of $2,000, in $5 shares; no shareholder permitted to hold more than ten shares, or have more than one vote. Preliminary to the opening, meetings were held for the adoption of the plan. Weeks were spent in the discussion. No one took any trouble to investigate past efforts, but each evolved out of his own consciousness the only safe and reliable method. At last a compromise was made, and a mongrel plan adopted that contained nearly all the faults of the others, and but few of the virtues.

Then came the momentous question of constitution and by-laws. Committee after committee labored, Sundays and week-day nights, when more discussion followed, resulting in more law than they really wanted, and fewer members than they started with, both of which facts worked together for good; for there was so much law no one ever expected to know it all, and the disaffected members were of the weak-kneed kind, and would have proved a heavy load to carry. Up to this time they had practically proved they could co-operate. So far, they were in earnest. They meant to have a store, the opening of whose doors would be the open sesame to untold wealth to themselves, and inconceivable good to humanity.

Next came the choice of officers. The men who had been positive, deliberative and unfaltering were ignored. Men were chosen who had kept quiet, or who had always kept with the majority,—men who had wormed themselves into the confidence of their fellows. Thus loaded, the store started. Six months found them with depreciated stock—failure before them. They had bought for cash and sold for cash. No one had stolen any money, but their $2,000 was worth but $1,000. Again the true leaders came to the front, and pointed out the inefficiency of the management. For once they were heeded. They took the reins of government and succeeded. Dividends were declared; the stock increased; the method and the law was simplified; confidence was restored. For a few years all went well. Then began the whisperings of discontent. The management was arbitrary. It cost too much to run the store. The storekeeper's salary was too large. It was more than a mechanic's wages. The store could run itself. This man and that should be taught that others could do as well as they. By much whispering and manipulation, many falsehoods and misrepresentations, the management was changed, innovations were introduced, a new storekeeper employed. The cautious were frightened and withdrew their money; an unwarrantable dividend was declared to reinstate confidence; trade fell off; and they failed.

Says a correspondent: "We have encountered a disadvantage which has almost invariably beset undertakings of this character. The want of capital has been one; but a lack of confidence in ourselves, and the inability to find an agent who would manage the business of the association as well as a prudent person would manage for himself, has prevented the realization of the best results."

Says another, writing from Fitchburg: "Co-operative stores are started by men who believe in them, and they are run successfully for a while, until the managers get sick of doing a great deal of work for nothing, and taking their pay in *curses* from the other members; and, step by step, they begin to go down until a disastrous failure overtakes them. One great difficulty with the co-operative store here was that its own members would not support it. Other dealers, knowing that they belonged to the co-operative store, would underbid on some articles, and by so doing would get the trade of many of our members, when in the main they were paying more for their goods than they would have had to pay at their own store."

A correspondent in a small village of but fifty houses, describes difficulties that are beyond the control of the workingmen. We give his experience in his own language. He says: "In this town there are three manufacturing companies. All the real estate in the vicinity is owned by these corporations, with the exception of four houses, on small lots, with a reserve in the deeds 'that the land shall be used only for the purpose of a dwelling-house.' One of the corporations carry on a general grocery and provision store. Two of the partners in this concern are also partners in one of the other companies, but in one they pay cash monthly for their labor; in the others they pay cash when they see fit, and truck for the remainder.

"A council of the Sovereigns of Industry was started in 1875, with 17 members, which was increased to about 50. They traded under the club-order system till July, 1876, and then started a store; whether on the right or wrong basis, it was their only chance. It was hard work to get enough together for a meeting. Some talked store, and wanted to start on a small capital; others thought it would be crushed out; some were afraid of being turned out of work.

"The first difficulty was to get control of a room to start in. One of the members had a little shoe-shop that stood on a piece of land that was not reserved in the deeding. He offered to start a store on the following plan, as an experiment, for six months: First, to raise $300 capital, the 'Council' to pay 7 per cent interest, one dollar per day to be paid for wages, one dollar for month's rent, the goods to be sold at the going prices in the vicinity, the profits to be divided among the purchasers according to the amount purchased, two-thirds to 'Sovereign' buyers, one-third to others. We did not have trade enough to pay the expenses for the following reasons: After he started the store, he was subjected to petty annoyances in the foundery, from the treasurer and the foreman, and at last they discharged him. It has not been decided what to do with the store yet; but, as a co-operative store, I think it is a failure.

"The corporations here own the labor, the homes, the school (for the school is partly run on the peon system). There is a fund called the —— fund, and this treasurer is trustee. We can't have a teacher without he consents; but we do have fair teachers, so we must, I suppose, thank our lord cardinal for that.

"To sum up the causes of failure, they are these: Want of unity among the members; too much unity among the controlling powers; not population enough in this vicinity to make co-operation successful; violation of trade contracts by some of the traders that we made terms with, and hard times.

"I do not pronounce this a complete failure yet, though it has that look now. I am in hopes, if we can live till spring, that there will be a reaction take place."

The failure of these experiments is not so much due to methods as to men. The men are masters of the method. When it is said that a store failed because it allowed credit, it only half states the fact. Who allowed credit? Not the storekeeper. He was the servant, subject to the majority. It was a failure to co-operate; for co-operation needs an intelligence equal to the settlement of such a question.

If the management is charged with dishonesty or inefficiency, the co-operators are also responsible. The judgment necessary to select the proper men is the first essential of co-operative success. Men are often selected to important positions because they are affable, agreeable persons, qualities to be encouraged, but of little avail if methods of business are unsound.

The mistake most frequently made, is, that the failure of co-operative stores is almost wholly due to financial causes; while there is absolutely no chance of failure for such reasons. That stores calling themselves co-operative may so fail, is true; but a *purely* co-operative store, never.

A purely co-operative store starts with a paid-up cash capital sufficient to purchase and distribute the goods agreed upon to a known number of customers already procured, without cost. They buy the best, because it is cheapest. They buy for cash only what is wanted, never anticipating demand. They sell for cash at a profit that will cover all the elements of cost and risk, including a per cent for capital, sinking fund, increase of business, propagandism, education and a small dividend to purchasers.

There is no system so simple, none with so little risk of failure, and yet there has been one continued story of failure from its inauguration, in 1845, to the present time. How to attempt to account for this seeming contradiction, was the purpose of this investigation.

In stating the causes of failure, we are met with the history of co-operation in England, or, rather, with so much of it as relates to success. The failures are never referred to in this connection.

The limit of this article could not enumerate them. That co-operative distribution in England, since 1843, has reached a wonderful success, is true, but that success is due to certain causes that do not obtain here among the working people.

Co-operation succeeds best where there is the most equality of condition, unity of action, and regard to discipline.

Lancashire is, above all parts of England, where artisans are employed, the most homogeneous, the most united, and the best disciplined. Schooled in the trades' unions, which are necessarily as strict in their discipline as an army, never overcrowded by hordes of foreign emigrants, energetic, speaking a dialect of their own, intermarrying for generations, employed to a large extent in one occupation, they were, and are, of all men, the best-conditioned for successful co-operative experiments. This statement is further illustrated by the fact that Scotland, where the same causes operate, is second only to Lancashire, while Ireland and the South of England have barely moved in this direction.

Not only have these causes contributed to these grand results, but the very embarrassments under which the working class labor have conspired to their good.

"Here in Massachusetts," says a contributor to a former Bureau Report, "it is much easier to rise, and nearly all who succeed desert their class, leaving behind poorer leadership than in England, where it is forced to stay in the ranks; and, as the masses there are more used to the control of managers than the corresponding class here, all workingmen's organizations there are, of course, more successful. There are also some very eminent outsiders who aid the English co-operators in their humble efforts; while here the corresponding class are engaged in politics or literature."

Even under these favorable circumstances, the pioneers and their successors found that the art of agreeing to disagree, and especially to agree with disagreeable persons, was hard to acquire. In this State and country there are no such conditions. Co-operation here must succeed through a superior intelligence, and the difficulty that is first met with is that utter defiance of discipline that is the boast and the shame of Young America.

Neither the Church nor the State nor the trades' union can enforce unpopular law. Even the militia have a chronic condition of insubordination.

Co-operation means discipline. The language applied by Thorold Rogers to co-operative production is applicable to co-operation in any form, only in less degree. He says: "The second condition of successful co-operation is strict management, due subordination, and unhesitating obedience to orders. The discipline of a manufactory is as essential as the discipline of an army, and can not be relaxed except with the gravest risk. It is plain that management and control should be intrusted to proper and accredited authority. It is equally clear that lawful orders must be obeyed, and that authority ceases to be respected when it can not command obedience. It is also certain that success in any joint or co-operative undertaking is conditioned by the harmonious working of all the contributory parts. When a machine is out of gear, its use is impaired, its employment is attended with waste and danger. Similarly, the mechanism of an undertaking cannot be dislocated without peril of ruin or at least of loss."

Without discipline, organization or leaders; with dissimilarity of tastes, opponents in politics and religion, heterogeneous, floating, in many cases with a conceit or self-importance that is the product of that "little learning" that is "a dangerous thing," how can we co-operate? Men who would gladly help are held back in dismay, by the oft-recurring spectacle of seeing the best men driven out of their advocacy. They see the suspicion and mistrust, the imputations and almost martyrdom of their friends.

What has been written of England can be repeated with emphasis here.

"Any one acquainted with the leaders of the chief working-class movements in this country for twenty years past, will bear me out in the assertion that the best men, whose capacity was greatest and whose pride and self-respect were strongest, have been driven out of the ranks by the social errors I have described. Had it not been so, the working classes would not now be, as they yet are, the pariahs of the state, whom *everybody compliments, but no statesman trusts*, and successive cabinets, by the common consent of the House of Commons, ignore.

"There are co-operative societies in this country older than the princely one in Rochdale, and which, situated in more important towns, have large opportunities of growth, *but membership in them has been a species of moral martyrdom.* The voice of dissension has never been silent, and internecine recrimination has impregnated the air, like typhus, and petty jealousies have squealed and squeaked through their rooms and over their counters until success has been scared away."

Many a store has been broken up with distrust, and honest, faithful servants driven in despair into the more merciful service of shopkeepers. "In some places a storekeeper durst not look well fed; if he grew fat, he would be condemned at once. The pay that is given is always computed upon the level of their own wages, and the abuse they receive is usually more than that of the average employer."

If such are the difficulties that beset ordinary co-operative storekeeping, what are the hopes of the immediate introduction of co-operative production.?

Co-operative production deals with the distribution of wealth in the process of production, and comes more nearly to the interpretation of the word as given at the head of this article. How this end is to be obtained, is worthy the study of the best minds of the Commonwealth; a subject for the investigation of which this department was created, and the establishment of which was the product of the co-operation of a few workingmen.

Thorold Rogers, from whose address, delivered at the co-operative congress of 1875, we have before quoted, says, speaking of that school of political economists who ignore the subject: "I admit that many of my brethren have, especially in past times, concerned themselves with the production of wealth too exclusively, and have neglected, for reasons once intelligible, the far larger and more fertile inquiry into the causes which retard or further its distribution. To be plain, I do not care one jot for rich people. I think they gain infinitely more from society than they confer upon it. The existence of many among them is a simple, unmitigated, unequivocal mischief. I am not concerned with the process by which they accumulate their resources. I am mightily concerned with watching, and, in my humble way, encouraging the process by which the nation makes progress, and by which it secures to itself the benefits of civilization."

He believes that the best aid to this result is co-operative production. Doubtless, this is true; but the important question now to solve, is how to co-operate. England, with upwards of 1,200 societies and 400,000 members, with all the favorable conditions heretofore mentioned, together with the aid and counsel of the ablest and wealthiest of her citizens, including Gladstone, John Bright, the Bishop of Manchester, and a host of others, with all these influences, she has but learned the primary lesson of co-operation,—the conducting of a store on joint-stock principles, with the additional element of a bonus to purchasers, and a per cent of the profits to educational purposes.

Yet with all of these favorable conditions, and after sixty-four years of agitation and experiment, Walter Morrison was forced to confess, and the secretary of the central board of the co-operative congress confirmed the statement, that the proportion of failures was as one in three. How then can the heterogeneous masses of our manufacturing and commercial cities be led to co-operate? Says Robert Kyle, at the same congress, "We need not be surprised if the twentieth century should dawn upon us before productive co-operation be established on a large scale in the great heart of society."

In Leeds, the education fund had been used for other purposes.

Thomas Hughes said, referring to the substitution of joint-stock companies for industrial societies, "In some of the most active centres of co-operation, the form of the movement is changing in a dangerous direction."

The central board, in their report, say:—

"The co-operative programme looked forward, as its end, to an immense social reform, to be evolved by the systematic regulation of the exchange of labor on principles of justice, instead of leaving it to be determined by the right of the strongest in the struggle of conflicting interests; yet it demanded, from those to whom the appeal was made to carry it out, no sacrifice of anything which they actually enjoyed; on the contrary, to every one it gave more than they actually received. But it did ask of them to use the new resources given them by their united action, to develop all the advantages which wise union could secure to them, for the benefit, not only of the individuals, but of the class to which they belonged; following, so far, in the footsteps of all true-hearted social reformers, who have always placed the general interest before the special advantage to themselves. We do not despair of seeing this rule of conduct, the principle of practical religion applied to our ordinary life, widely, if not universally, accepted, at least by those classes who would be benefited the most by its adoption. But certainly, at present, little advance to the realization of this hope has been made beyond the first step. The idea of unions through which the consumer may obtain command over the profit on his own consumption has made considerable progress. The idea of concentrating consumption by centres of supply has taken body in the important wholesale societies whose progress we have recorded. But the idea of using the fund thus obtained so that, while it shall be a growing source of pecuniary advantage to the consumers, it shall be also the means of gradually transforming these consumers into bodies of producers controlling their own work as free men should do, and sharing its proceeds under such conditions in relation both to capital and custom as they may consider just, has scarcely made any progress at all."

Mr. Mitchell said: "If a hundred men formed a joint-stock company, and employed themselves, where was the difference between that and a co-operative store?"

Mr. Holmes said: "The word co-operation expressed just what those who used it meant by it. Co-operation might be a pack of wolves united to drive a flock of sheep over a precipice; but that was not the co-operation that the early promoters of the movement had in their minds. He wanted a clear distinction to be drawn, and he would draw the distinction in this way: Private enterprise sought to advance the whole by each individual advancing himself; co-operation sought by advancing the whole to advance the individual. In what position did individualism find Rochdale previous to our present movement? The clever, the cunning and the selfish had oppressed the people to that extent that they were powerless as individuals, and they sought to unite for general purposes, and through the general to benefit the individual. They did this, and did it well. But there came a reaction." . . .

"Co-operation sought to advance the whole by means of propagandism; co-operators had established a co-operative organ; and they held meetings. The Civil Service Supply Association had done nothing for the public. It was true that a great many people who were well off gained an advantage in buying their goods cheaper, but nothing was done to introduce the benefits of co-operation among the poor and ignorant. The motto of the Civil Service Supply Association was, 'Each for himself.' Co-operation, on the other hand, though the movement was in its infancy, aimed to spread itself all over the world."

. . . .

"He did not agree with those who defined co-operation to mean making as much profit as possible, and dividing the whole of it. He repeated it, that co-operation meant working for the benefit of the whole; and acting for the benefit of the individual was only private enterprise. When a society divided its profit wholly between capital and the trader, and neglected the laborer, it was not co-operative; on the other hand, to divide profit with capital, labor and trade, was co-operative."

Mr. Neale, in his essay on a "True co-operative action between producers and consumers," says:—

"In distributive societies the workers are associated not as workers, but only as consumers. The work involved in the production of that which they consume lies beyond their immediate vision. The work done in the process of distribution forms so small a part of the whole, contributes so little to the profit earned, that it has been ignored altogether. Thus, those whom the consumers employed to do the work of distribution for them, and who were necessarily their employés, naturally slipped into being regarded as only their servants, and were looked upon with that mingled feeling of contempt and distrust with which servants are apt to be considered in the competitive world,—as inevitable plagues, to whom the least possible facility for teasing should be conceded. So far from occupying the post of the highest honor, as, in any society where a truly healthy moral tone prevailed, those would do who rendered any common service, and the more so the more that service was in its own nature unpleasant, it has been a common rule in distributive societies that no servant of any society can be a member of its committee of management; and only of late, and in a few instances, has the notion of giving them a direct interest in the business conducted by them, by making their earnings in any degree dependent upon its prosperity, gained ground. Now, as in other cases, we find that social organizations tend, in proportion to the hold obtained by them on society, to intensify the feelings they embody; so has it been in this case. The fact that in the distributive societies in which co-operation has taken body in the United Kingdom, the worker has been only the servant of the consumer, who has appropriated all the profit on his work after paying a moderate interest to the capital embarked in the business, has given birth to the notion that this is the true normal relation between production and consumption. A theory has been set up which, appropriating to itself the noble name of Federation, a name long before given to a widely different form of union, has justified this appropriation by two specious arguments,—first, that profits naturally belong to the consumer, since he pays for them; second, that to distribute the profit of work among the consumers is a means of raising the whole body of workers all together by the profit on their own consumption, instead of raising some over the heads of the others, as must be the case where the worker receives the profit on his work, unless the whole body of consumers could be set to work co-operatively at the same time. And this reasoning has been put into practical application in the productive establishments now set up by the wholesale, which are simply extensions of their distributive system, carried on by workers who are mere servants of the society of which they never can be members."

After speaking of the great advancement in methods of production, he says:—

"Who should have the benefit of this quicker, better work, or these improved methods? Certainly not those who did not do their work or introduce the method to the exclusion of those who did. Yet this is the logical conclusion from the premise that profits belong to the consumer, on which the wholesale founds its present system. It means this: profits should be dealt with on the principle of a Dutch auction, and adjudged to the lowest bidder. Always those shall have them who do not make them, not those who do. To state such an argument is to refute it logically. Would that it were equally easy to put an end to the disposition to act upon it practically!

"But is not the consumer, then, to have any share in these profits? Undoubtedly he should. He should, according to the rules of that equity which co-operation seeks to introduce, which embodies the divine maxim, 'Freely ye have received, freely give.' He should, according to the rule of actual practice. Superiority, whether of bodily organization or mental capacity, is a free gift of God to its possessors, which those who have should use for the common good, not seek to monopolize for their individual benefit. The practical application of this rule appears to involve an equal division with the consumer of the profits arising from any improvement of production. We know that this has not been done. The selfishness of the producer has led him to act toward the consumer as the consumer is now seeking to act toward him,—to monopolize profits as far as he can. But what men would not do spontaneously, by rising above natural selfishness, nature has compelled them to do by the conflict of their selfishness with each other. The inventor or improver has not been able to keep his secrets. Other men have learned to use them, and have calculated, that, by the increased sales, caused by diminished prices, they might gain more than by larger profits on fewer sales.

"The profits of production have thus been largely shared with the consumer through the pressure of competitive self-seeking. It remains for the co-operators only, to do by agreement, on reasonable principles, without the waste and other evils of competitive warfare, what, by this natural process, has been more or less perfectly done without any agreement."

Such is the plea of English co-operators. They state freely their dangers and difficulties, their hopes and fears. That an important crisis in their history has been reached, is evident; but they have already overcome so many obstacles in the past, they are not dismayed as to future work.

At the congress, from whose proceedings we have quoted, a grand plan of international co-operation was well received. We have given space to the views of our transatlantic brothers, because of their large experience and greater co-operative ability. It will be noted that their statements agree with the proposition that the moral difficulties are greater than the financial; yet the latter must not be overlooked. The raising of the large sums of money necessary for successful co-operative production, requires an extensive organization and an unlimited faith. The religious societies of the world have thus far exceeded all others in this direction. Propagandism is with them a prominent element. They have the organizations and the faith.

The working classes in this country have no organization to which they are bound by faith or hope. They are isolated and not amalgamated. Those who have been able, from any source or cause, to reserve any of their wages, are exceedingly cautious and prudent in their investment. The savings bank is to them the safest and best method. In some few instances they have allowed their employers its use without security, and their experience has, in many instances, proved disastrous.

It has taken nearly half a century to overcome the old habit of hoarding without interest, and the strongest motive in this was safety. When they can feel that co-operative efforts are equally safe, this class will seek that kind of investment, and then it will not need help from their hands.

The possibility of inaugurating co-operative distribution has been proven. The small amount of capital required, and the simplicity of the plan, render it financially practicable.

The distributive stores that have succeeded, as in Worcester, Natick and Springfield, are consequent upon the character of those engaged in the management.

The agent of the Somerset Co-operative Foundery says, "We selected our own men, and even then, had we not been successful, it is doubtful if we could have held them together."

At Andover, Fall River, and some other places, the clanship of occupation and race have aided them.

To render co-operative efforts of use in the solution of the labor problem, requires the existence of those moral elements that come from enlarged views of life and duty, but must follow increased opportunities for thought.

The narrowness and selfishness that looks only to the wants of the present, that ignorantly boasts of its superiority in skill, that causes the mechanic of one trade to ignore the claims of his fellow-laborer of another calling,—these must disappear before co-operation can be possible.

PART III.

MOTIVE POWER OF MASSACHUSETTS.

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MOTIVE POWER OF MASSACHUSETTS;

OR, THE LABOR OF THE SUN.

George Stephenson, the great English engineer, was the first to call the attention of the world to the fact that the comfort, convenience and economies of life in these days depend largely upon our ability to harness the heat evolved by the sun in the past, in the production of either heat or power today. Thus the sun raises, by evaporation from sea and land, water, which is transported through the air, and, falling on the highlands, descends toward the sea, moving water wheels and carrying factories, flowing through pipes and artificial conduits into our houses and buildings, and carving out the great river estuaries, and filling these harbors with the waters to float the great ships of commerce. Again, the treasures of the coal mines are proved by science to be only the charred remains of ancient vegetation, in which the primeval sun has done his work of decomposing carbonic acid and water into their constituent parts, storing the carbon and hydrogen in the vegetable, now become coal, and releasing the oxygen to the air, to be again combined into carbonic acid and water, with evolution of the heat originally required for the work of decomposition.

The statistics of the census of 1875, in water power and steam power, fairly may be classed as representing the labor of the sun in industrial operations in Massachusetts.

We are accustomed to speak of the great improvements of our time; but there is a fixed epoch in the world's history, forming, apparently, the point of departure of modern history and modern society, to which, in considering the work of our day, it is worth while to refer.

This date, the middle of the thirteenth Christian century, marks the beginning of our times. The foundation of English liberties had just been laid in the great charter of King John, and the confirmation and forest charter of Henry III. It was the time of Rodolph of Hapsburg and Alexander Nevskoi, the founders of the Austrian and Russian empires. Italy and the Moorish caliphates had recently undertaken the manufacture of silk. The Mediterranean commerce was in the hands of the Italian cities. The Hanse towns, and the free cities of Flanders and Holland, were merchants, manufacturers and fishermen. The first German trading factory had been established in London shortly before, and Anglo-German commerce had just been systematically inaugurated. The condition of industry was very primitive. The copper mines of Cornwall had not been discovered. Zinc was not produced in Europe. The product of gold and silver was supposed to equal the wear and tear of coin and plate. England produced no iron. The first mention of the mining of coal, as an industry, appears towards the close of this century, in the charter of Newcastle. Cast iron, except as an accident, was unknown, and the waste in working by the Catalan forge and the German stuckofen was so great, that the slag heaps of that day are found to contain sixty per cent of iron, and have been in our day profitably reworked! Gunpowder was not efficiently used in European war till the beginning of the fifteenth century, and the battle of Pavia, in 1525, was the first ever won by musketry.

Paris, Cambridge, Bologna and Oxford were the seats of learning; and the studies of a university education were,—grammar, logic, rhetoric, music, arithmetic, geometry and astronomy. The study of law, as a science, had just been revived, and the oldest sea codes and the Castilian Siete Partidas date from about this period. Banking, exchange and insurance can be traced in elementary forms to this epoch. The mariner's compass (that is, the magnetic needle mounted on a pivot, and inclosed in a box swung in gimbals) had not been invented, though the property of a magnetic needle to point north was known, and the observation and study of its variations begins with Columbus in 1492. The paper manufacture began a hundred years later in France, and two centuries later in England.

There were no chimneys nor glass windows in the houses, and for several centuries afterwards glass windows were furniture, and not part of the house, and were taken out and stored when a house was unoccupied. Every man carried around his own knife to eat with. One or two drinking cups sufficed for a house. Four beds are mentioned as an extravagance in the house of an English gentleman in the sixteenth century. Most of the clothing was leather, and yet the total appraisal of a tanner's stock at this time was less than £10, or allowing for difference in value of money, $1,000 of our day. A carpenter's chest of tools of the period consisted of five articles and was valued at a shilling,—say $5 in our money. Maize and potatoes were unknown. Wheat, under their unskilful culture, is thought to have yielded about nine or ten bushels to the acre. In England, cabbages and parsnips seem to have been the only vegetables common, and, on the Continent, turnips and carrots. Sugar was an imported luxury, used only by the great, and tea and coffee were unknown till A. D. 1600, and were luxuries for a century later. The common kitchen spice-box, and its contents, was absolutely unknown.

The water powers of Europe were unused, save in the smelting regions, where a rush of water through a funnel, into and down a vertical air-box with air-holes at the top and an air and water tight chest at the bottom, was sometimes used to produce a blast with a few pounds' pressure, such as is now used in the Catalan hearths of the Pyrenees, and save perhaps that a few undershot wheels, drove at that time the wipers of a few light trip-hammers. The steam engine of Hiero of Alexandria still remained a toy. Breadstuffs were ground in hand-mills, and occasionally by windmills.

The European of that day was a great advance upon the savage, skin-clad or naked, of earlier times, dwelling in caves and having only stone and bone and horn implements. But his clothing was no better than that of the Persians in the time of Darius, or the Romans of Cicero's days. The metallurgy, except in the certainty with which steel could be made at enormous cost by the armorers of Milan, Toledo and Damascus, had not advanced beyond that of the Romans of the time of Cæsar. Other industries were about where the Egyptians left them. The maritime carrying trade was not improved beyond that of the Phœnicians and Carthaginians, except by the introduction of mercantile sympathy and co-operation in the matter of exchange and insurance. Population about held its own; but it is estimated that the average life of those under twenty was only ten years. Extensive epidemics prevailed, and almost every nation in Europe underwent a famine as often as once in ten years, and scarcities more frequently.

The noticeable difference between that time and now is the improvement in the value of man, the change in the employment of capital and power, and the increased comfort and happiness of the world. And it is these lessons that the power statistics of the census teach us.

A horse power in mechanics was so named by James Watt because it represented the utmost efforts of the strongest horses during short intervals; and it is that amount of energy which is equivalent to the continuous raising of 33,000 pounds at the rate of one foot in a minute; and with a good engine it is roughly represented by the evaporation of a cubic foot of water from a temperature of sixty degrees Fahrenheit, under a pressure of fifteen pounds to the inch in an hour. Considering the losses it suffers when generated by coal, or by falling water, and transmitted through shafting and belting to the working of machinery, it may be estimated at the extreme physical exertion of six men. It ought to cost an expenditure, in the ordinary engine in use in the State, of about six pounds of coal an hour, or say eighty pounds of coal a day. This, with coal at eight dollars a ton, gives the cost of the physical force of a man daily at less than six cents in coal, and less than twenty-five cents upon an outside estimate, to include interest, depreciation, rent, insurance, attendance, oil, repairs and all other loadings, properly chargeable to power.

Manufacturers of machines used in industrial occupations are much in the habit of estimating the power required for them as delivered horse power,—that is to say, as the power absorbed in the machine itself; and manufacturers of engines have consequently been obliged to make allowances in their engines for the power absorbed in running shafting, etc., and grade their engines at less power than they actually deliver. An empirical formula, taking into account the dimensions, velocity, working pressure, condensation between the boiler and engine, and average loss by friction and transmission, has given the result of the census tables "actual horse power," as the potential energy actually delivered from the engines to the main shaft. This result is larger than the estimated power, from the fact that the estimates are usually made on a velocity and pressure much lower than that at which the engines are intended to work, so that there may be no failure to carry the mill in the outset. A similar rule prevails with regard to water wheels, but the elements of a calculation about them are of a more difficult character, and are to be taken account of specifically in each case, and two of them are exceedingly variable and difficult to obtain; namely, the weight and the velocity of water flowing through the wheel. The adaptation of water wheels to their conditions of use is also generally done for the particular instance in each case of any great importance; so that, though probably in all instances there is a percentage more of power delivered to the main shaft than the estimated power, it will not be so largely in excess as in the case of steam, and may be safely assumed as reported, in considering the value of the sun's labor in Massachusetts in terms of men.

This power is substantially all employed in manufacturing operations, in which it appears that 316,459 persons are employed, or about a fifth of the population of the State.

The following table exhibits the steam and water power of the State in the different industries, with the number of persons actually employed in those industries, May 1, 1875. But in this table the number of persons employed is only given for those industries in which steam and water power is used;

while the total number of persons employed in manufacturing industries is 316,459 :—

INDUSTRIES.	Persons employed.	Steam Power.			Water Power.	
		Engines.	Nominal power.	Actual power.	Water wheels.	Nominal power.
Agricultural implements,	1,131	13	597	1,158	31	877
Arms and ammunition,	1,109	8	352	683	18	753
Artisans' tools,	1,589	23	251	487	69	1,506
Bags and bagging,	233	2	325	630	-	-
Boots and shoes,	48,536	242	4,454	8,641	4	176
Boxes,	1,565	52	1,674	3,247	72	1,295
Building,	4,031	39	1,014	1,967	7	101
Carpeting,	3,158	10	1,210	2,347	6	765
Carriages and wagons,	3,157	30	591	1,146	26	448
Chemical preparations,	201	8	154	299	-	-
Clocks and watches,	1,140	3	14	27	1	2
Clothing,	14,443	35	1,280	2,483	6	250
Cotton goods,	50,738	134	20,895	40,536	292	32,959
Dress trimmings,	278	3	24	46	-	-
Drugs and medicines,	372	8	85	165	-	-
Dyestuffs,	-	2	450	873	-	-
Fertilizers,	304	8	376	729	3	50
Food preparations,	4,760	97	3,240	6,285	181	4,390
Furniture,	6,712	77	2,797	5,426	110	2,405
Glass,	1,226	9	296	574	2	30
Leather,	6,774	198	4,389	8,515	63	1,061
Linen,	779	3	225	436	6	225
Liquors and beverages,	899	37	748	1,451	7	86
Lumber,	2,095	102	3,733	7,242	521	10,362
Machines and machinery,	9,323	194	5,366	10,410	74	2,183
Metals and metallic goods,	17,539	218	11,741	22,777	135	4,991
Musical instruments and materials,	2,263	22	591	1,146	1	10
Oils and illuminating fluids,	682	26	980	1,901	-	-
Paper,	6,792	66	3,020	5,859	298	14,527
Printing and publishing,	5,608	80	916	1,776	4	114
Print works,	1,769	104	6,945	13,473	40	4,294
Polishes and dressings,	115	6	165	320	-	-
Railroad construction,	537	12	615	1,193	-	-
Rubber,	1,054	12	1,570	3,046	-	-
Saw and grist mills,	-	-	-	-	162	3,008
Scientific instruments and appliances,	375	6	179	347	2	40
Stone,	2,560	34	775	1,503	-	-
Tobacco,	1,451	1	3	6	3	120
Vessels,	1,463	12	325	630	1	8
Wooden goods,	4,363	82	2,975	5,771	164	3,751
Woollen goods,	18,478	129	7,923	15,370	309	13,994
Worsted goods,	1,499	6	865	1,678	15	955
Miscellaneous manufactures,	22,840	363	13,179	25,567	96	4,846
Totals,	253,941	2,511	107,307	208,166	2,729	110,582

The power consists of,—

Steam (horse power),	208,166
Water (horse power),	110,582
Total,	318,748

Equal to the labor of 1,912,608 men. Now, if we consider that it would require a population of five to one to correspond to this manufacturing power, it would make an enormous increase in the human value of Massachusetts on the scale of past times. But this would hardly be fair; while considering the ratio of families to persons in productive industries, it would not be fair to make the ratio less than 3 to 1. This would give to Massachusetts a producing capacity equivalent to a population of 7,389,736 souls, or about 4½ times as great as it is now.

In other words, the productive value of a resident of Massachusetts is at least four times as great as that of a burgher of Ghent, or a subject of England or France, at the time of the Great Charter and the Crusades, and the productive value of the State is more than three times that of all England at the same period.

This increase of productive capacity having been achieved by machinery so devised as to convert, as we have said, the stored heat of the sun into present power, it is interesting also to consider the fact, that the conversion is made by means which render permanent and of present productive value the mental and physical labor of inventors and workmen in the past. A labor-saving machine may be defined as a contrivance by which the dead still work. The boiler, the engine, the water wheel, the shafting, the belts, the manufacturing machines, all present instances in which labor performed in the past is efficient in the production of to-day. The hand no longer throws the shuttle. The heat of the sun in the carboniferous era gives the force, the intelligence of Edward Herbert, Marquis of Worcester, of Newcomen, of James Watt, of a score of builders of engines and their workmen, still working in unconscious iron, convert the heat into motion and do the weaving of the world. The permanent character of that part of the labor, intellectual and physical, of inventors and mechanical artisans which characterizes the implements of modern factories and shops, has had this phenomenal result, that it has practically enabled one generation of men to do the work of four.

And yet the influence has not been alike on all industries. In horology, twenty-nine horse power, or the physical force of 174 men, representing on the scale we have chosen a population of 522, supplements by the aid of accurately thought-out machinery the work of 1,140 souls, representing a population of 5,700, and by the aid of this very machinery in which human thought is so formularized in metal as to go on forever with the cheapest power doing the work of very competent men, represents a far greater increase in the production of clocks and watches than the average ratio of 4½ to 1, while the 20,386 horse power of the paper workers which supplement the labors of 6,792 souls in the business probably represents a less productive ratio. In the one case, the watchmaker represents the physical force of 1.15 men. In the other, the paper worker represents the physical force of more than 18 men. In textile fabrics, with 70,715 work people, we have 105,492 horse power employed, representing in each operative the physical force of nearly 9. The hard work of the leather business is done for 6,774 persons by 9,576 horse power, while the 1,565 box makers consume 4,542 horse power. The horse power called directly to the assistance of the worker on tobacco hardly amounts to half the work of a tender to a man, while the makers of carpeting employ a horse power to an operative. The 48,536 boot and shoe workers, with their infinite subdivisions and wonderful use of highly organized machinery, only employ 8,817 horse power, or about a man power each beyond his own force, while the furniture artisan employs 1.1 horse power, and the lumber workers, 2,095 in number, employ 16,865 horse power, giving each a physical equivalency of about fifty men. In the manufacture of food preparations, only 4,760 persons are employed in the State, much of our food being imported, yet they consume 10,010 horse power, having a productive equivalency of more than 12.7 to 1.

These comparisons might be indefinitely extended, but enough has been shown to illustrate the productive capacity of labor performed in the past, the reproductive faculty of modern labor.

And it is labor thus rendered reproductive, stored and made generative, that we call to-day, capital. The capitalist of to-day is the natural ally of the laborer. He it is who with the stored labor of the past still generative, efficient and vital, gives to the laborer in one calling a hundred-fold efficiency, to another a fifty-fold efficiency, to some more, to some less. He it is who brings, by rail and boat, food to the countries which convert and create non-edible products, and carries clothing to those who would either be naked or cease from work at their best production to clothe themselves. In this modern use of stored and regenerative labor, a communal system has been revived, and the men are gathered into factories where power and machines are set up, where co-operative subdivision of labor exists, and where special facilities are provided, and special faculties selected and improved. The weaver of Ghent and Bruges, in the thirteenth century, of Spitalfields early in this century, the shoemaker of twenty years ago, worked in his own house and was comparatively his own master. But his hours were longer, his fare more meagre, his clothing poorer, his comforts less than those in similar occupations to-day.

The list of necessaries of life is now a long one, and that of distant luxuries still longer, for all of us; but the experience of life insurance, and our own statistics, teach us that human life has lengthened since the time of the tables of Carlisle, and no cause can be assigned for this but a general improvement in bodily comfort and environment. This can have but one reason,—the increased productiveness of daily labor,—caused by the generative and reproductive energy of the stored labor of old time, and the harnessing of the sun to the hard work of to-day.

An instructive contrast is presented between the use of capital in the old time and now. Richard of Cornwall was in the thirteenth century the richest man of Europe. His tin mine royalties brought him in great revenues, and he hoarded them. He is said to have carried out of England 700,000 marks, equivalent in our money to about $45,000,000, and spent it all in bribing the electors and princes of Germany to crown his personal ambition by an election as king of the Romans, a position in which he hoped his power would gratify his avarice, and, by burdening industry, repay him his purchase money, with usury.

The three men of great fortune who recently died in this country,—Astor, Stewart and Vanderbilt,—with larger capitals than that of Richard, employed them very differently. One furnished houses of first-class character to his lessees at moderate rates; one devoted his life to learning the wants and tastes of the community and gratifying them; one furnished and controlled transportation facilities. Each and all gave personal and constant supervision to his affairs, and each and all found alike the source, the investment and the reproduction of his wealth in an improved condition of mankind. These men, and the acquisition and use of their property, are types of their period, as Richard's is of his period. And to them, each in his own sphere, labor stored and generative, and the sun harnessed to the daily work of the world by the talent of man, was an immense source of revenue.

This marked improvement in mechanical results, this wonderful control of man over motive power, is accompanied by as marked improvement of the condition of man, and establishes the proposition that demand, so far from preceding supply, increases parallel with it, accommodates itself to it, and, in many instances, is created by it. Certainly it is a current use of language, in considering a new enterprise, to say, Can we create a demand for it? Owners of property desiring to sell or let it, often offer to supply things the other party to the transaction does not particularly desire, to carry the transaction through; and purchasers or hirers often suggest the absence of things they do not want, to obtain an abatement of price.

Two or three notable instances of improvement will illustrate this. Glass windows were at their first introduction furniture, subsequently they became fixtures, and finally a part of the house. Yet within a century the aura of their original condition had so much power that English statesmen imposed a window tax as well as real estate taxes, and the objection of double taxation was hardly advanced against it. The early water supplies of great European cities consisted of aqueducts, conveying water to certain public squares, where fountains were erected, and whither the neighborhood came to fill their pitchers and buckets. By slow degrees, the introduction of water into houses was effected, at first by having a water tank filled daily from the main through a stop-cock, opened only by an official, and closed when the tank was full; afterwards by piping the house, then by adding heating apparatus, and having hot and cold water instead of cold water only, until to-day we have running water on every floor and in almost every room. Men of our own day can remember, in Boston, the tank in the cellar, into which the Jamaica Pond water was drawn, and the very gradual introduction of the extensive household water works now in use. This was done more largely and rapidly in houses built for sale and for hire than in those actually owned by their occupants. Gas was similarly introduced, more rapidly by builders building for sale than by persons occupying their own houses. These are clearly instances in which supply preceded demand. So also with the introduction of new tools and appliances of various sorts,—hot-air furnaces, steam-heating apparatus, the cheap transportation of cities and large towns by omnibus, barge and horse car. The production of a convenient thing, suitable for household use or for business, the acquaintance of the public with this product, the limited introduction of it, its exposition for sale, create the demand.

The wants of a free people increase as fast as their means of supply, and continually stimulate increased production by the individual. Contentment with one's lot is the virtue of the subjects of a despotically governed and non-progressive state; and self-denial is the virtue of a poor and unprosperous people.

In every improvement in production, whether in means of tillage, or in conversion of raw into manufactured articles, the change works injury to some, and benefit to others. Doubtless Elias Howe was cursed thirty years ago for inventing, and the great sewing-machine companies for introducing, machines which would deprive seamstresses of their means of subsistence. But it can not now be said that the number of persons getting their bread by sewing, by machine and by hand, bears a less proportion to the population than it did then, while their work gives better and larger results, and the clothing of the world is cheaper and better and more frequently renewed because of this invention and its development.

Again, take the application of explosives to mining operations. Does any one doubt that it has, in the long run, eased the labor of the miner, cheapened the product of the mine, increased mining operations, and increased the demand for mining labor, thus raising the wages? Of course the introduction of any improvement in the arts creates a temporary disturbance and demands a readjustment of relations. But we are to consider results when they have all resulted, and not at the moment of disturbance. If we were required to measure the quantity of water in a cylindrical vessel partly full, and had no means of measuring anything but the height at which the water stood, nothing to empty it into, no recollection of the number of cubic inches in a gallon, and only a quart pot and a pail for measures, there would be but one way to do it,—take the depth before and after taking out a pailful, measure the pailful and multiply the quantity in the pail by the quotient found by dividing the greatest height by the difference in height. We should, however, in getting the two heights, have the water in a state of rest, and not in motion caused by the disturbance of taking out and putting back the water. The fallacy of persons who object to the introduction of labor-saving machinery is, that they measure the disturbance and make no account of the readjustment.

The introduction of printing from movable types enabled us to *multiply* copies of books instead of *adding* them, painfully, letter by letter. Doubtless, the copyists of the time suffered; but does any one doubt that more men are at work at book making, and with better pecuniary results now than before the time of Fust and Gutenberg? Yet, readjustment was not fully accomplished till within a century,—that is, till authors abandoned the compensated dedication of books, emancipated themselves from the patronage of the great, and trusted to the public to recognize merit.

Power spinning, the stocking frame, improved methods of weaving, undoubtedly caused disturbance in the wages and in the employment of very many men. Riots of the unemployed occurred, but demand soon readjusted itself to increased supply, and the work of men was demanded for making the machines as well as for making the goods.

City passenger railroads were introduced into Boston in 1855. To avoid disturbance of certain social and industrial conditions existing, the railroad corporations bought off the omnibus lines previously existing on their routes. The labor performed by the horses is far more efficient in moving a car over the iron rails than in moving an omnibus over pavement; certainly in greater proportion than three to one. Hackmen, livery-stable keepers, and all consumers of horseflesh felt it. The same sort of economy of power was, about that time, inaugurated in other cities of the United States. The disturbance has readjusted itself in twenty odd years of street railroading, and the price of the quality of horses used for this purpose has risen from twenty-five to fifty per cent, and with it the cost of almost every article used in the service of the railroads, while the fare has remained at a minimum. As a general rule, wages have also increased, and yet, as a rule, net earnings have not diminished. The reason for this is shown by the statistics to be an adjustment between the demands of travel, and the accommodation whereby economies are effected and the best results obtained.

Another instance within the observation of every middle-aged man confirms our line of remark, that the result of the increased facilities of production is the increased advantages of the individual. Successful electro-plating with silver was first introduced as an industrial art some thirty-five years ago. Before then, silver surfaced articles were made of good quality, either of solid silver, or of copper and silver in thin sheets or bars, soldered together and then stretched. An early result of the introduction of electro-plate was the practical destruction of the rolled-plate business, and a later result has been the serious diminution of the silversmith's handicraft. But the use of silver surfaced articles has spread from the rich and middling classes toward those less favored by fortune, more money is invested in electro-plate than was before in rolled-plate and silver, the convenience, neatness, comfort and economy of using a non-corrodible instead of a rusting metal, and a comparatively light-plated article instead of a heavier one of silver or pewter, and a comparatively stiff and elastic article instead of a comparatively soft and flexible one, has resulted in placing a plated spoon in the mouths of rich and poor alike.

There are two factors of prosperity in the condition of man, generally acknowledged and well understood,—earnings and purchasing power. But beyond these is a third, which is an exponent as well as a factor,—the promotion of luxuries to the grade of necessaries of life.

The needs of society increase from generation to generation. The power to supply them has increased from time to time. Man has already acquired control of a means of multiplying his physical force. He has already acquired means of formularizing much of his thought in metal, and of producing with that many results by mere application of power which formerly required the slower and more uncertain operations of the hand, controlled by the sensitive brain. He has solved the problem of making the thought of one age control the stored power of a former one to do the work of a third. He has made of fire and water his servants, and by his engines harnessed them for his hard work. The individual claims the reward of an improved condition and environment, because of the conquest of nature already achieved. He has got it. So much has his stature increased that the average armor of olden times would be a very close fit for the average man of the same nation to-day. His chance of life has increased, within historic times, at least ten per cent. His productive power has increased fourfold; and there is no question that his demands for consumption have kept measurably near the producing capacity, and, whether it be a cause or a consequence, the reflex action of stored and regenerative labor, and of the sun harnessed to the hard work of the world, has been that the entire producing capacity of the world is needed to supply its fullest wants, that periods of scarcity and leanness are less felt, operate more upon reserves and luxuries than upon actual present necessities and have less permanent effects, although from the happy condition of discontent with one's lot which superior condition and environment has brought about, they are probably more generally discussed and more searchingly investigated and more intelligently guarded against and remedied than ever before.

PART IV.

THE AFFLICTED CLASSES.

THE BLIND, DEAF, DUMB, IDIOTIC AND INSANE.

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In the family schedules distributed by the census enumerators in the spring of 1875, information was solicited concerning certain afflicted classes in Massachusetts,—the blind, the deaf, the deaf and dumb, the idiotic and the insane. The facts sought for were to embrace not only the actual number of individuals in each of those classes, but were to include also data of the causes of the disability. These accumulated facts touching the numbers, age, sex and locality of the people in this State affected as above mentioned, and touching also the causes and duration of their infirmity, have been submitted to an analysis of which it is the aim of this paper to give the results.

These afflicted classes are inevitably a burden upon society. In proportion to their disability, the blind, the deaf-mute, the idiotic and the insane are dependent upon their fellow-men for sustenance. They eat the bread which they do not earn, and consume what they have small part in producing. They are the unfortunate and pitiable objects of human commiseration. Happily, in these latter days, enlightened philanthropy has done unspeakable good in alleviating the condition of these, the unsound in mind and body; and the State does well to honor the memory and the labors of those who, with assiduous devotion, have wrought out the methods which give light to the darkened eye, reason and self-control to the clouded mind, and speech to the mute tongue.

It is one of the functions of the census to determine the statistics of these classes, to ascertain the amount of this burden upon the State, and to find its relative increase or diminution at intervals of ten years. This undertaking is of modern origin; it had no place in the census taken under the Servian constitution of Rome, nor in the enumerations under the Mosaic law. In England, a country to which we are accustomed to look for all that is excellent in these matters, it was not till 1851 that the afflicted classes were numbered; and it was not till 1871 that a complete enumeration, embracing lunatics out of asylums, and idiots and imbeciles, was made. Of 32 governmental census returns made between 1860 and 1870 in Europe and the United States, Dr. Jarvis found only 24 which gave statistics of the blind, 29 of the deaf and dumb, 16 of the insane, and 14 of the idiotic. It is believed that the recent census of Massachusetts attained in these respects a completeness as regards details and fulness of data beyond anything hitherto secured, at least in this country.

The "prior schedule," or "family schedule," used in this census, possessed especial advantages as a means of acquiring the desired facts, in that it permitted deliberation and family consultation preparatory to the filling of the blanks. Even in cases in which the head of the family failed for any reason to fill the schedule, the census enumerator found the information awaiting him and ready for his record with much less delay and inaccuracy, than would have been the case under the older method of house-to-house visitation, with the requirement of unpremeditated answers to personal, and in many respects, disagreeable questions. An inspection of the schedules, as returned to the bureau, shows abundantly that householders and heads of families appreciated the utility of the work to which they were called to contribute; an honest and conscientious purpose to fulfil the request made is apparent in almost every case.

It is to be remarked, however, that a valid claim of absolute accuracy can hardly be made in behalf of all this accumulated information. It is to be understood that these returns afford an approximation only to a correct statistical knowledge of the afflicted classes in Massachusetts; and while we have no hesitation in asserting that the present census has surpassed all previous similar attempts to gather this knowledge, we are yet free to grant the limitations to which all such endeavors are subject. To fulfil the requirements of scientific accuracy in results, would necessitate the application of scientific tests and methods in gathering the data for those results. The statistics here analyzed are supplied by the people themselves concerning their own physical condition, or that of kindred or dependents. In only a portion of the cases do we have the aid of professional medical skill in supplying the original facts. The hospitals and asylums give, indeed, the best information attainable with regard to certain of the classes under consideration; and it may be remarked, too, that in a great many individual instances we have the reflection of skilled medical opinion in the returns, the nature, degree and cause of the infirmity being entered in the schedule in accordance with the previously expressed view of the family physician, or of some specialist from whom relief was sought. But there is a great mass of the material which is based substantially upon personal, unskilled judgment; sometimes, indeed, the basis has a flavor of the fanciful and the superstitious.*

These reflections upon the character of the statistics returned are designed to promote a more intelligent understanding of the results reached, without, however, an undue disparagement of their value,—to point the way to better methods, without decrying the improvements already attained. The kind of knowledge which the census gives is of more moment than its amount or variety. "The tendency toward complexity in the nature of the returns must always be checked," says Dr. Farr, "by the liability of the people at large to make blunders and create confusion where they are required to attest facts not of the most obvious nature, and by the difficulty of getting a sufficient number of subordinate officers to understand and carry out a complex classification." The time will doubtless come when, instead of relying upon the statement of individuals that their children are "dumb" because of the "Massachusetts school system," or "idiotic" because "marked with a snake," or "blind" because "moonstruck," the compiler of statistics of the disabled classes will feel full confidence in his facts, knowing that in the course of their primary enumeration they have been submitted to uniform standard tests, such as are applied for example by the oculist who determines the degree of blindness in his patient by means of the test type, or by the aurist who ascertains deafness and its amount by the distance at which the ticking of a watch is heard. The science of vital statistics is one of slow growth. Experience will continually point out retrospective defects and suggest improved methods. Perfection in the census of a people, as in all other human undertakings, is attainable by slow approaches, if it be attainable at all. The approximations offered in the present instance are the result of a system matured with exceptional care, and are believed to be possessed of exceptional value in point of freedom from the errors both of omission and commission.

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* For the purpose of acquiring full information of the classes here considered, the plan pursued in the Irish census of 1861 appears to have some special advantages, although it involves an increase of labor and trouble. The family schedule, which gave the name, age, sex and locality of the afflicted person, was supplemented by a new set of special inquiries for each person so returned. This special requisition embraced facts with regard to causes, correlative infirmities, and many other circumstances touching the defect. The commissioners well remark that "had these minute inquiries been made upon the original householders' schedules, the returns thereto might, by imposing too heavy duties upon those who filled or collected the forms, have been either defective or have interfered with the accuracy of the general enumeration."

The Blind.

The number of persons who reported themselves in this class is 2,512.* This number gives a rate of fifteen blind persons in every 10,000 of the population of Massachusetts, or one person blind in every 657. This ratio is greatly in excess of what has been found by the census of this State in previous years, and in excess also of the proportion determined in other countries. In 1865 the ratio was one in 1,663, and in 1855 it was one in 2,404; both of these enumerations probably fell far more short of the truth than the number in 1875 exceeds the truth. In 1871, in England, the ratio was one blind to every 1,052 persons; in Scotland it was one to 1,112, and in Ireland it was one in 852. The magnitude of the aggregate in Massachusetts, as set forth in the census, is to be explained in two ways: partly by the fuller returns made, but mainly by the fact that many have reported themselves as blind who, if special inquiry were made, would be found to be, not totally blind, in the meaning and intent of the prior schedule, but deprived of sight to a very considerable degree; the enumeration has determined a near approximation to the number of persons in Massachusetts who are destitute of vision to a degree which incapacitates them for the usual avocations of mankind.

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* In this analysis of the statistics of the blind in Massachusetts, the town of Chatham is left wholly out of the account as regards the number both of the blind and of the entire population, the enumeration of persons deprived of sight having been manifestly erroneous.

The subjoined table shows the distribution of these numbers of the blind in the several counties. It will be observed that the proportion of the blind to the population is largest in the rural counties, and least in the counties containing the cities and large towns.

Persons reported as Blind, their number in each County in 1875, and their proportion to the Population.

COUNTIES.	Blind.	Blind in every 10,000 of Population.	Population to each Blind Person.
THE STATE, . . .	2,512	15	657
Barnstable, ...	73	11	409
Berkshire, ...	117	17	584
Bristol, ...	151	11	868
Dukes, ...	18	44	226
Essex, ...	292	13	765
Franklin, ...	70	21	481
Hampden, ...	172	18	548
Hampshire, ...	57	13	786
Middlesex, ...	395	14	719
Nantucket, ...	11	34	291
Norfolk, ...	117	13	755
Plymouth, ...	134	19	518
Suffolk, ...	513	14	711
Worcester, ...	392	19	536

The number of those reporting themselves as blind, and their number in proportion to the people, is seen to be in excess, as a rule, away from the centres of population. The cities and manufacturing villages attract the young and the sound from the agricultural sections and from across the ocean. The old, decrepit and infirm are thus left in excess in the country. These observations are further illustrated by the ratio of blind persons to population in some of the Massachusetts cities. Thus, in Boston (the inmates of the Perkins Institution and of the Massachusetts Charitable Eye and Ear Infirmary being excepted from the account), the proportion was one blind person to every 926 of the people; in Lowell, one in 1,156; in Cambridge, one in 1,167; in Fall River, one in 1,334; in Lawrence, one in 1,126.

Thirty towns in the State appear to be especially favored; their inhabitants report themselves exempt from the infirmity under consideration. But none of these towns have more than 3,000 inhabitants, and their aggregate population is less than two per cent of the population of the State.

Of the total number of the blind, 1,407 are males and 1,105 are females. In proportion to the population, the former are as one to 564 of the whole number of males, and the latter are as one to 775 of the whole number of females; in other words, there are 18 males blind in every 10,000 of the male population and 13 females blind in every 10,000 of the female population. This excess of blindness among the males is undoubtedly due to the greater outdoor exposure of men, and to their greater liability to accidental injury.

The following table exhibits the age distribution of those in Massachusetts who report themselves deprived of sight:—

AGES.	Blind.	Population.	Proportion: One in—
Under 10 years,	96	337,593	3,517
10 to 19 (both inclusive),	283	314,301	1,112
20 to 29, " "	242	310,861	1,285
30 to 39, " "	239	240,966	1,008
40 to 49, " "	313	182,823	584
50 to 59, " "	354	126,430	357
60 to 69, " "	348	79,186	228
70 to 79, " "	414	38,283	92
80 to 89, " "	183	10,126	55
90 and over,	34	1,041	31

It will be observed that in childhood the proportion of blind persons to the general population is at the minimum.

After the age of 40 years, the increase is progressive until, in advanced life, it is found that one person in every 31 is deprived of sight in greater or less measure. In childhood, both sexes share alike the infirmity of blindness; after the age of 20 and until the age of 70, blind men are in excess of blind women; after the age of 70, females are more numerous than males in this class, the excess corresponding nearly with the excess of females in the general population above the age mentioned.

Of the total number of persons reporting themselves blind, 201, or one in 12 of the whole class, are described as "blind from birth." According to the latest English census, the proportion of the born blind to the total of blind persons was one in 11 in England and Wales.

Among the matters included in a study of blindness in any community, the cause or causes of the infirmity are of obvious interest and importance. Information upon this point, so far as Massachusetts is concerned, is afforded as one of the fruits of the late census. Of course, for very clear reasons, there can not be the same exactness in this part of the schedule as in the matters relating to sex, age and occupation, but of the answers returned a very large proportion show intrinsic evidence of genuineness. This being the first attempt to define the causes of the blindness among the people of the State with some detail, we can not make a comparison to show whether through improved skill in ophthalmic surgery, or from other causes, certain kinds of blindness are diminishing. The following table gives a numerical exhibit of the causes as they were returned in 1,618 cases, and includes those cases only which show tolerably well-defined marks of accuracy. The sources of the information upon which this table is founded are to be remembered, and the conclusions to be drawn are subject to modification accordingly. In many cases, the causes assigned are undoubtedly derived from medical consultation; in many more instances, probably in the majority, the decision is that of the sufferer himself, who is not expert in discovering an obscure real cause for his infirmity in the place of an apparent but erroneous one. Such names as amaurosis, cataract, Bright's disease, and glaucoma, indicate the intervention of professional skill in the case, while other assigned causes show quite plainly that a coincidence has been made to stand as a substitute for the real agency in producing the effect.

1. Accidents by gunpowder,	70
2. by firearms,	27
3. mechanical,	3
4. unspecified,	452
5. Age,	60
6. Amaurosis,	20
7. Belladonna,	2
8. Bright's disease,	4
9. Cataract,	238
10. Diphtheria,	2
11. Diseases of brain and nervous system,	96
12. Diseases, constitutional and specific,	46
13. Erysipelas,	31
14. Exposure,	23
15. Fever, scarlet,	55
16. typhoid,	7
17. yellow,	2
18. unspecified,	26
19. Glaucoma,	13
20. Injury of head,	15
21. Inflammation,	205
22. Measles,	59
23. Malpractice,	8
24. Optic nerve, disease of,	28
25. Overwork,	65
26. Retina, disease of,	3
27. Rheumatism,	13
28. Small-pox,	29
29. Sunstroke,	16

Gunpowder has had a considerable part in the production of blindness in Massachusetts, the premature explosion of blasts being the chief cause of the injury. Frequently sight is totally lost by this accident, and in many more cases where one eye is destroyed the other follows its fellow by sympathetic inflammation. Accident by firearms, including the mischief done by percussion caps, is in the same class.

The cases of lost sight attributed to age would probably be redistributed after a careful investigation. The degeneration of the crystalline lens, known as cataract, would include most of these instances.

Belladonna is given as the cause of blindness in two instances. Whether the drug was given in the form of atropia by a physician for its specific effect to dilate the pupil of the eye, or was taken for other purposes, or was used without medical advice, we are not informed.

Cataract is given as the cause of blindness in 238 instances. The constant progress making in ophthalmic science and art suggests the hope that this cause of lost sight may appear in lessening numbers in the future. Indeed, it was not a rare note to find in a schedule as returned: "formerly blind from cataract, but sight is now partially restored by means of surgical operation."

Diphtheritic inflammation is charged with having caused two cases of blindness. Probably many more are included in the general class of unspecified inflammations.

Diseases of the brain and nervous system include a variety of causes, such, for example, as paralysis, fits, meningitis, hydrocephalus, disease of spine, headache.

Diseases of a constitutional and specific nature comprise cancer, scrofula, humors and syphilis.

Exposure expresses a variety of assigned causes, some of them of singular character. A considerable number of persons living near the sea attribute their loss of sight to the brightness of the sunlight upon the water. The exposures of army life are blamed by many blind men as the cause of their infirmity.

The mischief done by scarlet fever is partially represented in the 55 cases which place it at the head of the list of fevers in producing blindness.

Injury of the head, blows, falls and the like, caused loss of sight in 15 instances.

Rheumatism produces its harmful effects on vision by attacking the sensitive muscle of the iris, and causing a serious and often irreparable inflammation.

In these days, small-pox does less harm to the eyesight than falls to the blame of either scarlet fever or measles.

Sunstroke is charged with 16 cases of blindness.

At the Perkins Institution and Massachusetts Asylum for the Blind, the principal charity in the State for the reception and instruction of the blind, the number of occupants in May, 1875, was 118; the original causes of the loss of sight in these cases were given in 55 instances, as follows:—

Inflammation,	12	Fever,	2
Accidental injury,	8	Hereditary,	2
Scarlet fever,	7	Amaurosis,	1
Scrofula,	4	Blow on the head,	1
Malpractice,	4	Hydrocephalus,	1
Cataract,	3	Diphtheria,	1
Gunpowder,	3	Fall	1
Measles,	2	Mumps,	1
Disease of optic nerve,	2		

THE DEAF.

The number of those who reported themselves as deaf (deaf-mutes excluded) is 7,241,—forty-four in every 10,000 of the entire population, or one person deaf in every 228. Obviously, this proportion does not express the exact amount of this disability in Massachusetts; on the one hand, it gives a ratio too large for the number of the totally deaf, while, on the other, it does not represent the whole number of those whose function of hearing is partially lost or indeed seriously impaired. This result arises from the difficulty which belongs to any attempt to discriminate degrees of disability by any standard short of an exact scientific measure.

The following table, giving the distribution of the numbers of the deaf in the several counties, shows that the people of Barnstable County are especially afflicted with this defect, while the inhabitants of Suffolk County are the least subject to it.

Persons reported as Deaf, their number in each County in 1875, and their proportion to the General Population.

COUNTIES.	Deaf.	Population to each Person Deaf.
THE STATE,	7,241	228
Barnstable,	276	116
Berkshire,	365	187
Bristol,	333	394
Dukes,	26	157
Essex,	1,007	222
Franklin,	248	136
Hampden,	434	217
Hampshire,	368	120
Middlesex,	1,320	215
Nantucket,	14	229
Norfolk,	437	202
Plymouth,	384	181
Suffolk,	775	471
Worcester,	1,254	168

Many of the contrasts apparent in the above table would disappear if the same census enumerator gathered the facts for the entire State, or if all persons, census enumerators included, were endowed with identical faculties of observation, and shaped their judgments by the same measure. It has been the experience of most governments that data of a specific nature, like those of the afflicted classes under consideration, were much more fully returned from rural than from urban populations. This experience is exemplified in the next table, which gives an analysis of the numbers of the deaf reported in each city and in the State at large. By this it appears that only one of the cities, Salem, gives a proportion of deaf persons to population less than that of the State. If we seek an explanation of these contrasts outside of errors and omissions in the enumeration, the chief determining element of the disparity may be found in the greater proportion of young and healthy persons in the cities, or conversely, in the greater relative number of elderly persons in the country, persons more subject to the infirmities of advancing age.

CITIES.	Deaf.	Population to each Person Deaf.
Boston,	677	505
Lowell,	125	398
Worcester,	212	232
Cambridge,	133	359
Fall River,	58	782
Lawrence,	34	1,027
Lynn,	131	249
Springfield,	123	252
Salem,	148	175
New Bedford,	94	272
Ten Cities,	1,735	394
Rest of State,	5,506	176
The State,	7,241	228

With regard to the sex distribution, the number of males reported deaf is 3,733, or one in 213 of the male population; the number of females is 3,508, or one in 244. Here, again, as in the case of the blind, the greater exposure of men impresses itself.

The age distribution of the deaf is exhibited in the following table:—

AGES.	Deaf.	Population.	Proportion: One in—
Under 20 years,	696	651,894	937
20 to 39 (both inclusive),	1,584	551,827	348
40 to 59 " "	2,124	309,253	145
60 to 79 " "	2,131	117,469	55
80 and over,	669	11,167	17

The progressive increase in the proportion of deaf persons in each vicennial period of life, is suggestive of the decay of power and impairment of function which come with advancing years.

The observation illustrated in the last table, that age is an important factor in the matter of deafness in any community, finds further exemplification in an analysis of the assigned causes of the defect. Of the 7,241 persons avowing themselves deprived of hearing, 4,815 give their opinion of the circumstances in which their deprivation occurred. Nearly a fourth of this number (1,067) assign advanced age as the cause of their deafness. Scarlatina is next to old age in the list, 951 cases being charged to the account of this scourge of childhood: Inflammatory action, variously described as otitis, sores in the head, ulcers in the head, abscesses in the ear, catarrh, was the cause of deafness in 878 persons. Fevers of various kinds, typhoid being the chief, are charged with 280 cases. Congenital cases numbered 230, and hereditary cases, 211. Measles are the assigned cause of 216 instances. Among the 283 cases of deafness caused by accidental injury, are 44 which are ascribed to the "discharge of cannon," or to "cannonading"; a number add the clause, "in the army." The "noises of trip-hammers" and other "factory noises," chiefly in boiler-works, founderies and cotton mills, are blamed by 50 persons. Others among the assigned causes are as follows: scrofula (144); neuralgia (48); disease of throat (32); cerebro-spinal meningitis (36); exposure (57); cold bathing and diving (40); erysipelas (30); diphtheria (31); sunstroke (17); whooping-cough (19); small-pox (15); thunder storms (11); cancer (5). Among the improbable and fanciful causes are: mumps (16); vaccination (4); asthma (2); hay fever (1); cholera (1); chicken-pox (1); fright (1); abuse (1).

THE DUMB.

Of this class, comprising presumably those persons who can not talk, but who can hear, and who are otherwise in the possession of unimpaired faculties, 129 were returned,—81 males and 48 females. It is highly probable that a careful inquiry into these 129 cases would result in a very material change in these numbers. Dumbness without deafness is very rare, and when not due to malformation is almost invariably a sign of idiocy; with the exception of a few instances of loss of speech due to anatomical defect, these 129 cases of so-called dumbness may fairly be assigned to idiocy or to deaf-mutism. Some support to our inference, that these statistics of the so-called dumb should be redistributed upon a new classification, is given by the fact that 81 of these cases, nearly two-thirds of the whole number, are under twenty years of age, and 43, or more than one-third the entire number, are under the age of ten years. There is no apparent reason why dumbness should be found in the young so exclusively, and the presumption is that careful investigation would correct such an observation. Seventy-five of the cases are reported as congenital. Very little information is afforded upon the schedules to guide judgment as to the causes of the loss of speech as alleged; one individual is recorded as "born without a tongue"; another was made dumb by shock; another, a Chelsea lad, was rendered permanently speechless by "fits caused by fear of the Pomeroy boy"; and, finally, another attributed his loss of speech to an "overdose of medicine."

THE DEAF AND DUMB.

According to the returns, the number of deaf-mutes in Massachusetts, in May, 1875, was 654. The census of 1865 ascertained 561 of this class of unfortunates. The enumeration of the deaf and dumb has always been found to be a task of considerable difficulty, but it is noteworthy that the several enumerations in this State have not been greatly at variance, one with another, when the proportion of deaf-mutes to population is regarded. This proportion in 1875 was one to 2,536; in 1865, it was one in 2,258. There are many good reasons for believing that the census of 1875 is not less accurate than that of ten years ago; if this be granted, we find that the proportion of the deaf and dumb is diminishing. We are certainly more highly favored in this regard than are most of the countries of Europe. The following table, copied from the report on the Irish census of 1861, gives some suggestive statistics upon this point:—

COUNTRIES.	Year of Census.	Deaf and Dumb.	Proportion of Population: One in—
Ireland,	1861	4,930	1,176
England and Wales,	1861	12,227	1,641
France,	1856	21,554	1,671
Belgium,	1856	1,989	2,277
Holland,	1859	1,219	2,714
Hanover,	1861	1,302	1,450
Prussia,	1858	13,297	1,334
Saxony,	1861	1,366	1,629
Bavaria,	1861	2,644	1,774
Wurtemburg,	1861	1,910	901
Denmark,	1860	1,357	1,920
Sweden,	1855	2,678	1,360
Norway,	1855	1,242	1,200

It will be seen that only one of the above-named countries, Holland, shows itself more exempt from the disability of deaf-mutism than Massachusetts. It is possible that more recent enumerations may have changed the above exhibit in some of the countries, but it is scarcely probable that our condition in this State would be found by the latest statistics to be comparatively deplorable. Judging by past experience, we may confidently anticipate progressive improvement in respect to the number of the deaf and dumb. Increasing skill in treating the diseases which cause deaf-dumbness and in preventing them from spreading, and improved methods in teaching the pitiable subjects of the defect, will lessen this unhappy disability.*

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* Upon the schedule returned by the Clarke Institution for the deaf and dumb at Northampton, is the suggestive note: "The pupils of this institution are deaf, but none are dumb."

The following table shows the distribution of the deaf and dumb in the several counties:—

Persons reported as Deaf and Dumb, their number in each County in 1875, and their proportion to the General Population.

COUNTIES.	Deaf and Dumb.	Population to each person Deaf and Dumb.
THE STATE,	654	2,536
Barnstable,	19	1,692
Berkshire,	24	2,845
Bristol,	40	3,277
Dukes,	22	185
Essex,	107	2,087
Franklin,	14	2,407
Hampden,	37	2,549
Hampshire,	12	3,735
Middlesex,	104	2,731
Nantucket,	-	-
Norfolk,	41	2,154
Plymouth,	35	1,982
Suffolk,	117	3,119
Worcester,	82	2,564

A noteworthy feature of the foregoing table is the comparative excess of the deaf and dumb in the counties of Barnstable, Dukes and Plymouth. The very high ratio in Dukes is especially remarkable; it is accounted for by the fact that by intermarriage a single family appears to have propagated this condition to an extraordinary extent, twenty of the twenty-two deaf-mutes in Martha's Vineyard bearing the same surname. A similar state of things was ascertained by the enumeration of 1865, when the proportion was one deaf-mute to every 175 of the population.

The sexes share the infirmity of deaf-mutism unequally in Massachusetts, the ratio among the males being one deaf-mute to every 2,219, and that of the females one to every 2,897. The numbers were 358 males and 296 females.

It is of interest and importance to learn the ages of the deaf-mutes in the State, so that we may know how many in the population are likely to become the proper subjects for an institution for the education of this class. The following is an exhibition of the ages of the deaf and dumb as reported:—

AGES.	The Deaf and Dumb.	Population.	Proportion: One in—
Under 5 years,	21	173,855	8,279
5 to 9 (both inclusive),	80	163,738	2,047
10 to 19 " "	115	314,301	2,733
20 to 29 " "	123	310,861	2,527
30 to 39 " "	105	240,966	2,295
40 to 49 " "	77	182,823	2,374
50 to 59 " "	51	126,430	2,479
60 to 69 " "	54	79,186	1,466
70 to 79 " "	26	38,283	1,472
80 and upwards,	2	11,167	5,583

Without doubt the number of the deaf and dumb at ages under five years is understated; a defect, we may remark in passing, that is common to every census enumeration, in Europe or America. The deafness of a child is hardly suspected for several months at least after birth; and parents are usually unwilling to be convinced that their child is actually destined to be a deaf-mute, the hope being entertained that at the worst the ability to talk is delayed only. So, too, if a child, after learning to talk, becomes deaf and then dumb by reason of disease, the parents naturally postpone their conviction that full power of speech is irrevocable. Hence, many children are returned as deaf who are really deaf-mutes, and the small number of the deaf and dumb reported as under five years old indicates that this disability was unrecognized or concealed on the part of the friends of many children whose exact condition would be determined and find a place on census schedules at a later period of life.

The excessive proportion of the deaf and dumb at ages between 60 and 80 is extraordinary and difficult of explanation.

Of the total number of deaf-mutes, 350 (194 males and 156 females) are returned as having been affected from birth. The acquired defect is therefore less than the congenital, cases of the former being to those of the latter as 100 to 110.

Among the principal causes assigned for the cases of the acquired deafness upon which the loss of speech so largely depends, the following may be mentioned:—

Scarlet fever is charged with 112 cases. Is not this a suggestive fact to be considered in connection with efforts for the prevention and limitation of this infectious disease? Of the cases of deaf-dumbness not congenital, scarlet fever is blamed, and probably upon good grounds, for nearly one-third.

Various forms of fever, other than scarlet fever, caused 29 cases.

Falls and other accidents caused injury in 28 cases which resulted in deaf-mutism.

Eighteen cases are ascribed to measles.

Cerebro-spinal meningitis is the alleged cause of 15 cases.

Inflammatory affections of the ear, of a nature not specified, caused loss of speech and hearing in fourteen instances.

Of diseases of the nervous system, we have paralysis (4), hydrocephalus (5), disease of the spine (6); in all, 15 cases.

The less direct and definite causes assigned were scrofula, whooping-cough, convulsions, cholera infantum, and croup.

Small-pox and diphtheria were credited with one case each.

THE IDIOTIC.

The total number of persons described as idiotic or imbecile in the population of Massachusetts is 1,340. Compared with the entire population, this number gives a ratio of one idiot in every 1,232 persons. This ratio is considerably less than that found in England and Wales in 1871 (one in 771), but it exceeds that found according to the census of Massachusetts in 1865 (one in 1,468). The most careful and altogether trustworthy enumeration of the lunatic and idiotic classes in Massachusetts with which we are familiar is that undertaken in 1854 by a commission on lunacy appointed under a legislative resolution. According to the report of this commission,* Dr. Jarvis found as the result of correspondence with the physicians in all parts of the State, and by means of careful research, that the idiotic class was then in the proportion of one in 1,034 of the entire population. This ratio is based upon a much more careful canvass than is likely to occur where the ordinary agencies of the census are employed, and is probably as nearly accurate as is practicable.

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* Report on Insanity and Idiocy in Massachusetts by the Commission on Lunacy under Resolve of the Legislature of 1854. Boston. 1855.

Persons are naturally sensitive about giving information concerning the mental deficiencies of their kindred, idiocy being generally regarded as a humiliating infirmity, to be concealed rather than described in detail to official canvassers. Especially would this condition of feeling be found in cities where cases of idiocy are less a matter of common cognizance than in rural communities in which family affairs are kept private with comparative difficulty. But the medical profession, the family physicians of the State, while they appreciate the technical distinction between mental defect or idiocy and mental disease or insanity, are able also to give exact numerical data of the cases which at one time and another come under their charge.

The number of idiots ascertained by the census, approaching as it does the proportion found by Dr. Jarvis twenty years ago, is undoubtedly a close approximation to the exact statistics of idiocy in Massachusetts at the present time. The diminution in the ratio may be explained partially by the increased number of immigrants within our territory, who, in forsaking their homes for a new world, have left behind them as far as might be those of their kindred who would encumber them in the efforts to get a living.

Idiocy is distributed among the counties of Massachusetts as follows:—

The Idiotic in Massachusetts, their number in each County in 1875, and their proportion to the General Population.

COUNTIES.	Idiots.	Proportion of Population: One in—
THE STATE,	1,340	1,232
Barnstable,	63	510
Berkshire,	65	1,050
Bristol,	77	1,703
Dukes,	7	582
Essex,	138	1,618
Franklin,	40	842
Hampden,	85	1,109
Hampshire,	42	1,067
Middlesex,	193	1,472
Nantucket,	3	1,067
Norfolk,	79	1,118
Plymouth,	86	806
Suffolk,	205	1,779
Worcester,	257	818

It will be observed that considerable diversity is shown with regard to idiocy in the several counties; the proportion varies from one in 510 in Barnstable to one in 1,779 in Suffolk. If we omit from the account of Suffolk the 94 inmates of the Massachusetts School for Idiotic and Feeble-Minded Youth (the only public institution of the kind in the State), the ratio for that county would be considerably lessened,—one in 3,287. The excess of idiocy in the country as compared with the city finds most ready explanation in the facts already suggested concerning the migration of people to the centres of population, these centres attracting not only the younger and stronger elements from foreign lands, but the productive and self-sustaining portion of the native stock from our own rural sections.

Idiocy has a very unequal distribution between the two sexes, the male idiots being greatly in excess. In 1875, there were in Massachusetts 835 males and 505 females in this class of unfortunates,—165 of the former to every 100 of the latter. The ratio to population is, among males, one in 951; among females, one in 1,698. This preponderance of idiocy among males has been observed to exist in other countries.

The ages of the idiotic class in Massachusetts are distributed as follows:—

AGES.	Idiotic.	Population.	Proportion: One in—
Under 10 years,	80	337,593	4,220
10 to 19 (both inclusive),	316	314,301	994
20 to 29 " "	253	310,861	1,229
30 to 39 " "	205	240,966	1,175
40 to 49 " "	160	186,823	1,141
50 to 59 " "	128	126,430	988
60 to 69 " "	78	79,186	1,015
70 to 79 " "	47	38,283	814
80 and upwards,	17	11,167	657

Two inferences at once suggest themselves upon a review of the foregoing analysis: the comparatively small proportion of idiots at ages under ten years indicates that a considerable number of idiotic children are overlooked in the enumeration, the parents of such children very naturally concealing the mental defects of their offspring through inability or unwillingness to recognize such an unhappy condition in those near to them, until the advancing age of the subject of the infirmity renders such concealment difficult; and, secondly, the excess of the proportion at ages over seventy suggests that the mental weakness and imbecility of the decline of life have been erroneously described as idiocy,—the truth being, that idiocy, in the great majority of cases a congenital defect, should diminish in proportion to the population from youth onward. We may fairly conclude, however, that the former of these errors is cancelled by the latter, and that our aggregate number may still be accepted as a true approximation to exactness.

The causes of idiocy have always been an interesting study. Dr. Howe, whose authority in such matters will not be questioned, says with great emphasis: "We regard idiocy as a diseased excrescence of society, as an outward sign of an inward malady. . It appears to us certain that the existence of so many idiots in every generation *must* be the consequence of some violation of *natural laws*." * Among the indirect or more immediate causes of mental defect, Dr. Howe mentions the intemperance of parents, self-abuse, intermarriage of relatives, and attempts to produce abortion resulting in permanent injury to the *fœtus in utero*.

In the report upon the census of England and Wales for 1871, the following occurs: "Residence in deep valleys, damp and unwholesome climate, crowded dwellings or other unhealthy conditions, intermarriages among a limited number of families, and more especially where weakness of brain already exists,—these are allowed to be predisposing causes, and as they are obviously within human control, the hope may be entertained that the extent of this affliction may be limited in the future."

The data supplied by the recent census in Massachusetts are too meagre and indefinite to form a basis for satisfactory conclusions with regard to the causes of idiocy in this State;

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* Report made to the Legislature of Massachusetts on Idiocy. By S. G. Howe. 1848.

they serve merely as an expression of the popular notion of the matter, and as such alone they are here presented. Of course it is manifest that many of the causes assigned, being post-natal, are erroneous, and that exact investigation would find nearly all cases to be dependent on ante-natal conditions necessarily obscure to ordinary intelligence.

Epilepsy is set down as the cause of 159 cases of idiocy. Fevers of various kinds are charged with 49 cases. In 18 cases, fright of the mother during her pregnancy is the alleged cause. Blows on the head, falls and injury at the time of birth, are assigned as having caused idiocy in 34 cases. Intemperance of the father is given in 11 instances. In 10 cases the parents were cousins. This matter of the close relationship of the parents, as contributing to idiocy as well as to other abnormal peculiarities, mental and physical, is well worthy of careful investigation. Among the less fertile and more remote causes assigned are the following: hydrocephalus (6), rickets (10), harsh treatment in childhood (3), sunstroke (3), measles (3), fright (4), masturbation (2), overdosing (2).

THE INSANE.

A correct enumeration of the lunatic class in any community is as desirable as it is difficult. It is important to ascertain the exact measure of this special burden upon the State and to determine its relation to pauperism. It is of great consequence, also, to learn whether the burden is increasing; whether the restless activity of our modern modes of life is impressing itself upon the public health in increasing degrees and necessitating the enlargement of the facilities for treating mental disease. But for the reasons mentioned previously, the sensitiveness of people with regard to the mental maladies of their kindred and the unwillingness to report such cases, many instances of insanity of mild or intermittent type inevitably escape mention upon the census schedules. This error of omission applies of course to those cases of lunacy remaining at home, not being violent enough to require treatment in hospital and not yet cast off by their kindred to become a public dependence as pauper lunatics; so that the deficiency, being limited to a special and numerically minor class of these unfortunates, while it should be regarded in any analysis of the statistics of lunacy as affecting the aggregate in some degree, is not of very great magnitude.

As a result of the enumeration in May, 1875, we have a total of 3,637 insane persons in Massachusetts at that time. This is in the proportion of one lunatic in every 454 of the entire population, or 22 to every 10,000. This ratio is in marked excess of that found by census enumeration in some foreign countries. In England and Wales, by the census of 1871, the proportion was one in 574; in Ireland, by the census of 1861, it was one in 821; in France, in 1856, it was one in 1,028; in Sweden, in 1855, it was one in 938. These comparative statistics, while they show that the burden of lunacy is relatively excessive in Massachusetts, serve also to confirm our view that the number of insane reported is a very close approximation to exactness.

The data which we have at hand, and the means for verifying them, are unsatisfactory for the determination of the interesting question whether lunacy is increasing in this State. Every enumeration is admitted to be defective in greater or less measure, but it is difficult, if not impossible, to ascertain the degree of deficiency. The following is a statement of the relation of lunacy to population according to the latest statistics based upon enumeration :—

YEAR.	According to—	Insane.	Proportion of Population: One in—
1854, ...	Lunacy Commission, .	2,632	427
1860, ...	United States Census, .	2,105	585
1865, ...	State Census, . .	2,391	529
1870, ...	United States Census, .	2,662	548
1875, ...	State Census, . .	3,637	454

There is good reason for believing that of the above, the first and the last are the most reliable, and furnish the closest approaches to correctness. If this be granted, it is evident that while the actual number of the insane is increasing, the relative number, when population is regarded, is not becoming alarmingly greater, as some would have it appear.

Of the 3,637 lunatics in Massachusetts in 1875, 2,272, very nearly two-thirds of the whole number, were inmates of public or private institutions for the insane, distributed as follows:—

State Hospital, Worcester,	488
State Hospital, Taunton,	555
State Hospital, Northampton,	481
State Almshouse, Tewksbury (chronic insane),	334
McLean Asylum, Somerville,	153
Boston Lunatic Hospital,	187
County Receptacle, Ipswich,	61
"Herbert Hall," Worcester,	6
"Shady Lawn," Northampton,	3
"Psychopathic Retreat," Roxbury,	4

The remaining 1,365 persons insane were either cared for at home by their friends, or, as paupers, were dependent on public support in town almshouses and private families.

These 1,365 lunatics, *not in hospitals*, were distributed in the various counties as is shown in the subjoined table:—

COUNTIES.	Insane.	Proportion of Population: One in—
Barnstable,	55	585
Berkshire,	64	1,067
Bristol,	101	1,292
Dukes,	5	814
Essex,	200	1,117
Franklin,	57	591
Hampden,	58	1,626
Hampshire,	39	1,137
Middlesex,	260	1,091
Nantucket,	5	640
Norfolk,	88	1,004
Plymouth,	88	788
Suffolk,	100	3,647
Worcester,	245	856

Here, again, as in other classes of the infirm in the general population, we see the influence of migration in increasing the relative amount of lunacy in the country sections.

In the matter of sex distribution, we find an excess of female lunatics; there were 1,704 males and 1,933 females, or 89 of the former to every 100 of the latter. The proportion in each case to population is: for males, one lunatic in every 466; for females, one in every 443.

The ages of the insane, so far as they are reported, are distributed as shown in the next table:—

AGES.	Insane.	Proportion of Population: One in—
Under 20 years,	96	6,791
20 to 29 (both inclusive),	527	590
30 to 39 " "	740	326
40 to 49 " "	801	228
50 to 59 " "	596	212
60 to 69 " "	462	171
70 and upwards,	342	145

It is a well recognized fact among those skilled in the treatment of mental disease, that the curability of a case depends to a considerable degree upon its recentness, the chronic insane being especially intractable. Among the matters concerning which data were gathered in the census was the duration of the disease in cases of lunacy. As the result of the inquiry, we have information upon this point concerning 3,128 of the 3,637 cases. In these 3,128 instances, the duration of the disease is returned in 144 cases as less than one year; these most recent cases are only 4.6 per cent of the whole number described. Of cases under five years' duration, there were 1,184,—37.8 per cent. The remaining 1,944—62 2 per cent of the whole—are returned as of more than five years' duration.

The supposed causes of the mental alienation are described in a minority—37 per cent—of the cases. The subjoined table presents these causes in their numerical summary, as they were returned from five large hospitals and from the friends of those who were not under hospital treatment:*—

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* Returns of the presumed causes of lunacy were not made with reference to the inmates of the Boston Lunatic Hospital; this will account for the omission of that institution from the table.

CAUSES.	Worcester.	Taunton.	Northampton.	Tewksbury.	McLean.	Out of Hospitals.	Total.
Hereditary,	29	20	–	4	5	94	152
Epilepsy,	25	26	33	9	1	34	128
Intemperance,	29	31	24	15	1	27	127
Masturbation,	34	33	–	10	2	12	91
Prolonged illness,	24	23	–	–	5	16	68
Uterine disease,	21	14	1	6	–	15	57
Overwork,	11	10	–	4	23	16	64
Injury to the head,	11	11	5	4	1	47	79
Domestic trouble,	12	3	–	3	2	31	51
Grief,	12	10	–	2	–	25	49
Puerperal,	12	14	–	–	8	15	49
Religious excitement,	9	9	–	2	2	18	40
Disappointed affection,	7	1	–	2	1	29	40
Business trouble,	5	11	–	2	1	24	43
Paralysis,	7	6	1	–	1	22	37
Sunstroke,	5	4	4	2	1	21	37
Overstudy,	4	3	1	–	4	20	32
Old age,	6	11	–	–	–	11	28
Fever (typhoid, scarlet, brain),	6	5	1	1	–	31	44
Anxiety,	2	11	–	–	1	7	21
Fright,	3	2	–	–	–	15	20
Spiritualism,	4	3	–	–	1	4	12
Excesses,	4	–	–	–	8	–	12
Softening of brain,	–	–	–	–	–	8	8
Measles,	1	3	–	–	–	6	10
Disease of brain and spine,	6	–	–	–	–	10	16
Overuse of narcotics,	–	–	–	–	–	6	6
Congenital,	3	–	–	–	2	2	7
Syphilis,	–	1	–	–	3	–	4
Parents cousins,	–	–	–	–	–	3	3
Small-pox,	–	–	–	–	–	2	2
Lightning,	–	–	–	–	–	3	3

PART V.

PAUPERISM AND CRIME.

PART V.

PAUPERISM AND CRIME.

In volume I. of the Massachusetts census of 1875, which is specially devoted to the people and social statistics concerning them, a presentation is made, by towns, of the number of paupers and convicts in the State. Owing to the fact that paupers and convicts are congregated in the various charitable and correctional institutions maintained by the Commonwealth, the town or county exhibit has little, if any, practical value or significance. The primary object of the census was to obtain the *number* belonging to the dependent and criminal classes, and the town presentation was the easiest and most obvious. In the presentation referred to, the paupers and convicts were distinguished by sex, and, in addition, a classification by place of birth was given.

The object of this part of the Report is to give fuller particulars concerning paupers and convicts than were comprised in the census volume. These points would have been shown there but for the fact that the information hereinafter given is of such a nature that descriptive text is needed to secure its thorough comprehension, that text, also, being necessarily interwoven with the figures presented.

The statistics which we present relate to the causes of pauperism and nature of crimes for which convicts were imprisoned, and to the place of birth, occupations, conjugal condition, present age and illiteracy, both of paupers and convicts. From their inspection many interesting and valuable truths become manifest, and the propriety of their presentation as statistics of labor can not be questioned. We do not desire to trench upon the particular duties of any other department, but the facts presented point so clearly to certain conclusions relative to the education, both intellectual and industrial, of the pauper and criminal classes, that we deem a brief discussion of the statistics peculiarly appropriate in this Report. In a state in which labor had all its rights there would be, of course, little pauperism and little crime; on the other hand, the undue subjection of the laboring man must tend to make paupers and criminals, and entail a financial burden upon wealth, which it would have been easier to prevent than to endure.

Leaving further consideration of the facts arrived at until after their presentation, we now pass to the special statistics relating to—

PAUPERISM.

We first present a table, which shows the whole number of paupers, with the designation of sex:—

Number and Sex of Paupers.

COUNTIES.	Males.	Females.	Totals.
THE STATE,	2,388	1,954	4,342
Barnstable,	65	70	135
Berkshire,	77	56	133
Bristol,	155	136	291
Dukes,	8	11	19
Essex,	206	185	391
Franklin,	57	52	109
Hampden,	370	197	567
Hampshire,	22	36	58
Middlesex,	639	645	1,284
Nantucket,	21	17	38
Norfolk,	77	57	134
Plymouth,	159	120	279
Suffolk,	339	156	495
Worcester,	193	216	409

These figures, it should be stated at the outset, represent only those receiving *full* support on the census day, May 1, 1875. The number may have been more or less a week before, or more or less a week after the day mentioned. The secretary of the board of state charities, in his report for 1876 (see page 89), gives the number receiving full support any part of the year, as 7,749, and the average number fully supported, as 4,977. The preceding figures are given simply as an indication of approximation. Between the returns of the census for a given day, and the careful averages of the board of state charities, based on a year's statistics, there can obviously be no complete or satisfactory comparison, and in dealing with both paupers and convicts we shall confine ourselves to the census figures.

We have already stated that the town or county exhibit of pauperism should not be made the basis of credit or derogation. The location of large charitable institutions in certain towns, gives them and the county in which they are situated, an undue and unjust prominence. For instance, Monson in Hampden County, Tewksbury in Middlesex, and Boston in Suffolk, were the designated residences of 1,846 paupers out of a total of 4,342.

A classification of paupers by place of birth is subjoined:—

Birthplaces of Paupers.

PLACE OF BIRTH.	Males.	Females.	Total.
In town where now pauper,	892	691	1,583
In other towns in Massachusetts,	646	443	1,089
Maine,	46	32	78
New Hampshire,	46	45	91
Vermont,	26	22	48
Rhode Island,	20	23	43
Connecticut,	13	18	31
New York,	35	20	55
New Jersey,	1	-	1
Pennsylvania,	5	1	6
Maryland,	3	1	4
District of Columbia,	2	1	3
Virginia,	6	4	10
North Carolina,	1	2	3
South Carolina,	3	2	5
Louisiana,	2	-	2
Mississippi,	1	-	1
Tennessee,	-	1	1
Ohio,	2	-	2
Kentucky,	1	-	1
Illinois,	3	1	4
Michigan,	1	-	1
California,	1	-	1
Canada,	31	21	52
Nova Scotia,	14	15	29
New Brunswick,	11	12	23

Birthplaces of Paupers—Concluded.

PLACE OF BIRTH.	Males.	Females.	Total.
Cape Breton,	1	1	2
Newfoundland,	1	1	2
West Indies,	7	2	9
South America,	1	–	1
England,	52	48	100
Ireland,	421	480	901
Scotland,	16	11	27
Wales,	–	1	1
France,	1	–	1
Germany,	20	9	29
Holland,	–	1	1
Belgium,	1	–	1
Italy,	3	1	4
Spain,	1	–	1
Norway,	2	–	2
Sweden,	2	3	5
Portugal,	1	2	3
Austria,	–	2	2
Bavaria,	–	1	1
Switzerland,	–	1	1
Malta,	–	1	1
Africa,	2	–	2
India,	1	–	1
New Zealand,	1	–	1
Unknown,	42	34	76
Totals,	2,388	1,954	4,342

The commonly expressed and received opinion that our pauper class is almost entirely composed of persons of foreign birth receives no support from these statistics. Out of 4,342, the whole number, 1,583 were born in the very towns in the State in which they are now paupers, and 1,089 were born in other towns in Massachusetts. The number born in the State, 2,672, is 61+ per cent of the whole number of paupers. If we add those born in other States of the Union (391), we find of American births, 3,063, or 70+ per cent. It will be said that we take no account of parent nativity; that many of those born in this country had foreign born parents. We can not see that this affects the matter greatly. The fact remains that we supply more full support paupers from among our native born population than we receive from foreign born residents. It will also be urged that no account is taken of those temporarily relieved by the State or town, or by private charitable societies. There is no reliable data bearing upon

either of these points, but, from the re
police of Boston, dated January 8, 1877,
"lodgers" at the station houses during tl
or 34+ per cent were born in the Unite
no doubt that the foreign born residents
on public and private charity than the
do not believe that the preponderance ag
as has been claimed and tacitly allowe
comparisons and percentages relating to
in the conclusion of this article.

Pauperism is a disease of the body pol
statistics concerning it can be more int
than those which show the causes for re
vate charity. We present the followin
"causes" are given, as returned by the
condensation having been made. The
and a classification by age made:—

Causes of Pauperism

	UNDER 10.		10 to 15.	
	M.	F.	M.	F.
Abuse,	–	–	–	–
Bad company,	–	–	–	–
Bad conduct,	–	–	–	–
Bereavement,	–	–	–	–
Convict father,	2	2	–	–
Convict mother,	3	1	–	–
Cruelty of parents,	–	–	–	–
Death of husband,	–	–	–	–
Dependency,	2	1	–	–
Desertion,	1	2	–	–
Desertion of children,	–	–	–	–
Desertion of father,	6	5	5	–
Desertion of husband,	–	–	–	1
Desertion of parents,	5	–	3	1
Disappointment,	–	–	–	–
Discharged prisoners,	–	–	–	–
Family trouble,	–	–	–	–
Fatherless,	2	3	5	2
Father a pauper,	6	–	3	2
Friendless,	–	–	–	–
Grandmother a pauper,	–	2	–	–
Hereditary,	–	–	–	–
Idiocy,	4	2	3	7
Ignorance and loss of head of family,	1	–	–	–
Illegitimacy,	9	5	2	1
Immorality,	–	–	–	–
Infancy,	1	2	–	–
Infirmity,	–	–	–	–
Injury,	–	–	–	–
Insanity,	1	1	1	–
Insanity of father,	–	–	–	–
Insanity of mother,	–	–	–	2
Intemperance,	–	3	–	–

Causes of Pauperism—Concluded.

	UNDER 10.		10 to 15.		ABOVE 15.		TOTALS.		TOTAL.
	M.	F.	M.	F.	M.	F.	M.	F.	
Intemperance of husband, .	-	-	-	-	-	18	-	18	18
Intemperance of father, .	11	10	8	8	4	4	23	17	40
Intemperance of mother, .	-	1	-	-	-	-	-	1	1
Intemperance of parents, .	25	11	7	5	3	1	35	17	52
Large family, bad management, ...	-	-	-	-	5	2	5	2	7
Loss of property, and business trouble, . . .	-	1	-	1	10	5	10	7	17
Mental infirmity, ...	-	-	-	1	26	43	26	44	70
Mental infirmity of parents,	-	-	1	-	-	-	1	-	1
Misconduct of parents, .	1	-	-	-	-	-	1	-	1
Mismanagement, ...	-	-	-	-	12	12	12	12	24
Motherless, ...	3	2	2	-	-	-	5	2	7
Mother a pauper, ...	51	52	4	-	-	1	55	53	108
Neglect, ...	-	-	1	-	-	1	1	1	2
Neglect of father, ...	-	-	1	-	-	-	1	-	1
Neglect of parents, . . .	1	-	1	-	-	-	2	-	2
No home, ...	-	-	-	-	-	1	-	1	1
Not given, ...	168	182	226	98	256	9	650	289	939
Old age, ...	-	-	-	-	119	154	119	154	273
Orphan, ...	14	13	10	12	1	2	25	27	52
Parents paupers, ...	13	23	5	3	1	5	19	31	50
Physical infirmity, . . .	11	11	6	5	354	264	371	280	651
Physical infirmity of husband, ...	-	-	-	-	-	1	-	1	1
Poverty, ...	6	5	4	-	18	41	28	46	74
Shiftlessness, ...	-	-	-	-	27	7	27	7	34
Shiftlessness of husband, .	-	-	-	-	-	2	-	2	2
Shiftlessness of parents, .	1	5	2	3	-	2	3	10	13
Shiftlessness of father, .	-	2	-	-	-	-	-	2	2
Sickness, disease, . . .	-	1	1	-	102	88	103	89	192
Sickness of father, . .	6	4	1	-	-	-	7	4	11
Sickness of husband, . .	-	-	-	-	-	5	-	5	5
Sickness of parents, . .	5	2	-	1	-	-	5	3	8
Sickness of child, . . .	-	-	-	-	-	1	-	1	1
Spent all his money, . .	-	-	-	-	1	-	1	-	1
Spiritualism, ...	-	-	-	-	-	1	-	1	1
Unable to work, . . .	-	-	-	-	5	8	5	8	13
Want of employment, . .	-	-	-	-	1	2	1	2	3
War, ...	-	-	-	-	1	1	1	1	2
Wife of convict, . . .	-	-	-	-	-	1	-	1	1
	359	354	302	148	1,727	1,452	2,388	1,954	4,342

It is to be regretted that 939, or 21+ per cent, failed to give the cause, but the returns of 3,403, or 78+ per cent, can be relied on. If from these returns we eliminate those suffering from mental or physical infirmity, we find that the idiotic number 306; the insane, 668; the physically infirm, 775; the aged, 273; the sick, 192, making a total of 2,214. These persons are undoubtedly unable to work, and are legitimate objects of public or private charity. Of the remaining number, 1,189, who give the causes, 584 attribute their pauperism, directly or indirectly, to intemperance. Deducting the intemperate, 584, from 1,189, we have left 605, of which number 422 give the actions of others as cause, and, of course, deem their state of pauperism as a circumstance beyond their control. This leaves but 183, besides the intemperate, who are, presumably, responsible for their present condition and likely to make an exertion to better it; but, of this number, 32 are under 15 years of age. These figures would seem to indicate that intemperance is the great and "unsatisfactory" cause of pauperism, while the great majority give what may be called "satisfactory" causes. Summarizing the previously given figures, we find the following condensed causes of pauperism:—

Idiotic, insane, infirm, aged and sick, . .	2,214, or 51	per ct.
Intemperance, directly or indirectly, . .	584, or 13+	per ct.
Actions of others, not personally responsible,	454, or 10+	per ct.
Poverty, bad management, shiftlessness, etc.,	151, or 3+	per ct.
Causes not given for	939, or 21+	per ct.

It will be noticed in the table which gives the classification by ages, that of the whole number of paupers considered, 1,163, or 26+ per cent, were children under fifteen years of age.

The "special instruction" sheet which was sent out as a guide to the proper filling out of the census family schedule, contained the following: "The occupations of paupers, before they became such, should be given." In the succeeding tables we present the results of the tabulation of occupations.

Occupations of Male Paupers.

Agents, ...	3	Cigar makers, ...	2
Bakers, ...	4	Clergyman, ...	1
Barbers, ...	4	Clerks, ...	3
Basket makers, ...	2	Cobblers, ...	3
Blacksmiths, ...	11	Comb maker, ...	1
Boot crimper, ...	1	Cooks, ...	2
Brass worker, ...	1	Coopers, ...	7
Broom makers, ...	2	Copper worker, ...	1
Butchers, ...	5	Curriers, ...	7
Cabinet makers, ...	10	Cutter, ...	1
Carpenters, ...	28	Dentist, ...	1
Carriage painters, . . .	2	Druggist, ...	1
Chair cane seaters, . . .	5	Engineer, ...	1
Chaser, ...	1	Engraver, copper-plate, .	1

Occupations of Male Paupers—Concluded.

Factory operatives, . . .	10	Pedler, fish, ...	1
Farmers, ...	117	Physician, ...	1
Fishermen, ...	12	Pilot, ...	1
Forgeman, ...	1	Plumbers, ...	2
Founderyman, ...	1	Printers, ...	8
Fruit dealer, ...	1	Pump maker, ...	1
Furrier, ...	1	Quarrymen, ...	2
Gambler, ...	1	Rigger, ...	1
Gardeners, ...	6	Rope makers, ...	5
Gentleman, ...	1	Roofer, ...	1
Glass cutter, ...	1	Salesmen, ...	3
Glass workers, ...	3	Saloon keeper, ...	1
Grocer, ...	1	Saw-mill operative, . . .	1
Hackman, ...	1	Servants, ...	3
Harness makers, ...	3	" 10 to 15 years of age,	2
Hatters, ...	4	Ship captains, ...	2
Herb doctor, ...	1	Ship carpenter, ...	1
Hostlers, ...	3	Shoe-factory operative, . .	1
Innkeeper, ...	1	Shoe heeler, ...	1
Iron worker, ...	1	Shoemakers, ...	67
Jewellers, ...	3	Silk printer, ...	1
Jobber, ...	1	Silversmith, ...	1
Junk dealers, ...	2	Soap maker, ...	1
Laborers, ...	305	Soldier, ...	1
Last maker, ...	1	Stevedore, ...	1
Liquor seller, ...	1	Stone workers, ...	10
Lithograph pressman, . . .	1	Students, ...	2
Lumberman, ...	1	Sugar refiner, ...	1
Machinists, ...	6	Tailors, ...	6
Manufacturers, ...	2	Teacher, ...	1
Marble rubber, ...	1	Teamsters, ...	7
Mariners, ...	39	Tinsmith, ...	1
Masons, ...	10	Tobacconists, ...	2
Masons, stone, ...	5	Traders, ...	2
Mast and spar maker, . . .	1	Upholsterer, ...	1
Merchants, ...	10	Wagon maker, ...	1
Mill overseer, ...	1	Waiter, ...	1
Miner, ...	1	Wheelwrights, ...	3
Morocco dresser, ...	1	Wood sawyers, ...	2
Musician, ...	1	Wood workers, ...	2
Nailers, ...	3	Woollen dyer, ...	1
Painters, ...	2	Not given, ...	887
Painters and glaziers, . . .	2	" " under 10 yrs. of age,	359
Paper hanger, ...	1	" " 10 to 15 " "	300
Pedlers, ...	7		

Occupations of Female Paupers.

Artificial flower maker,	1	Rope spinner,	1
Chair cane seaters,	4	Seamstresses,	8
Companion,	1	Servants,	211
Cooks,	3	" 10 to 15 years of age,	2
Dressmakers,	6	Shoe binder,	1
Factory operatives,	31	" under 10 yrs. of age,	1
Housekeepers,	27	Tailoresses,	4
Housewives,	224	Teachers,	3
Housework,	80	Trader,	1
Ladies,	4	Washerwomen,	5
Laundresses,	9	Wire worker,	1
Milliner,	1	Not given,	808
Nurses,	9	" " under 10 yrs. of age,	353
Nurserymaids,	9	" " 10 to 15 yrs. of age,	146

Of the 1,727 male paupers (we exclude the 661 male children), we find that 887, or 51+ per cent, do not state that they had any trade, profession or occupation before they became paupers. Of the 1,452 female paupers (we exclude the 502 female children), it is shown that 808, or 54+ per cent, did not return the names of the occupations by which they had formerly tried to support themselves. That one-half of the adult paupers considered were without any industrial preparation to gain a livelihood, can not be authoritatively stated, for undoubtedly many paupers were not personally inquired of, some failed to answer, and the idiotic and insane, of course, made no returns.

The figures show the impartiality of poverty, for nearly every branch of labor is represented; showing, at least, that no particular avocation is the direct road to the almshouse. Among the male paupers, the 28 carpenters, 117 farmers (including, no doubt, farm laborers), 305 laborers, 39 mariners and 67 shoemakers are the most noticeable in point of number. Among the females, the 31 factory operatives, the 331 engaged in housekeeping or housework, and the 213 servants are especially prominent.

The adult paupers numbered 3,179; of these, 1,695 returned no occupation. If from this 1,695 we deduct 974, the number of insane and idiotic, we find that but 721 adults, or 22+ per cent of the adults, failed to specify their occupation. The presentation given may, therefore, we think, be accepted as an indicative statement, so far as it goes.

From the tabulation of conjugal condition, several interesting points are learned.

Conjugal Condition of Paupers.

CONJUGAL CONDITION.	Males.	Females.	Total.
Single, ...	1,526	1,138	2,664
Married, ...	366	344	710
Widowed, ...	367	459	826
Divorced, ...	14	9	23
Unknown, ...	115	4	119
Totals, ...	2,388	1,954	4,342

If we deduct the children of both sexes from the number of single and from the total number, we arrive at the following percentages: Of the male adult paupers, 51+ per cent are single, 21+ per cent married, and 21+ per cent are widowers.

Among the female adult paupers, 43+ per cent are single, 23+ per cent married, and 31+ per cent are widows. Considering the adults of both sexes together, 46+ per cent are single and 49 per cent are or have been married. The impartiality of poverty is again attested.

We next present a table showing the ages of paupers at the time of taking the census, May 1, 1875:—

Ages of Paupers.

MONTHS.	Males.	Females.	MONTHS AND YEARS.	Males.	Females.
1 month, . .	4	1	7 months, .	2	-
2 months, . .	3	6	8 " . .	1	1
3 " . .	4	4	9 " .	3	3
4 " . .	5	6	1 year, . .	44	47
5 " . .	-	3	2 years, . .	38	32
6 " . .	-	1	3 " . .	29	22

Ages of Paupers—Concluded.

Years.	Males.	Females.	Years.	Males.	Females.
4 years,	28	29	54 years,	27	5
5 “	39	30	55 “	34	18
6 “	34	46	56 “	30	14
7 “	35	38	57 “	32	18
8 “	41	40	58 “	18	12
9 “	49	45	59 “	22	13
10 “	50	30	60 “	54	35
11 “	58	31	61 “	25	15
12 “	54	19	62 “	38	27
13 “	58	27	63 “	24	26
14 “	58	28	64 “	23	15
15 “	24	13	65 “	52	32
16 “	21	26	66 “	24	17
17 “	23	13	67 “	32	18
18 “	12	5	68 “	33	16
19 “	10	8	69 “	29	24
20 “	9	16	70 “	42	56
21 “	19	10	71 “	38	24
22 “	15	18	72 “	28	33
23 “	14	16	73 “	44	24
24 “	11	9	74 “	34	23
25 “	20	11	75 “	66	26
26 “	12	7	76 “	32	12
27 “	14	9	77 “	29	23
28 “	14	15	78 “	33	17
29 “	11	18	79 “	24	18
30 “	17	45	80 “	27	31
31 “	11	17	81 “	16	18
32 “	15	18	82 “	12	20
33 “	28	20	83 “	9	12
34 “	19	9	84 “	14	10
35 “	32	37	85 “	11	7
36 “	22	22	86 “	10	13
37 “	14	11	87 “	8	6
38 “	19	28	88 “	8	10
39 “	16	14	89 “	5	8
40 “	34	47	90 “	5	7
41 “	9	18	91 “	3	3
42 “	22	26	92 “	4	2
43 “	19	6	93 “	1	2
44 “	20	20	94 “	1	3
45 “	32	34	95 “	–	3
46 “	20	18	96 “	1	–
47 “	16	17	97 “	–	1
48 “	23	16	98 “	1	1
49 “	14	19	100 “	1	1
50 “	39	34	107 “	–	1
51 “	22	16	Unknown,	20	22
52 “	13	18			
53 “	22	19	Totals,	2,388	1,954

Adopting the arbitrary division used in the age presentation in the census, and calling those 15 and under and those over 60, the naturally *dependent class*, we arrive at the following statement:—

PERIODS OF AGE.	MALES.		FEMALES.		TOTALS.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
15 years and under, . .	661	27+	502	25+	1,163	27
Above 15, to and including 60,	920	38+	825	42+	1,745	40+
Above 60 years, . . .	787	33+	605	31+	1,392	32+
Totals, ...	2,368	-	1,932	-	4,300	-

The "unknown" are dropped in the above table. Combining the percentages of the naturally dependent classes, we find that 60+ per cent of the males and 56+ per cent of the females were either under or over the working or productive age. Of both sexes, 59+ per cent were of a non-supporting age. The burden of pauperism seems lessened when we see but 40 per cent of the full support paupers are of a working age, and reflect that among them will be found the due proportion of insane, idiotic, sick and infirm.

Among the paupers who had arrived at an advanced age, we find the following: *Males.*—A native of Medford, aged 96; one born in Weston, aged 100; and one born in Sheffield, 98 years of age. *Females.*—One born on ship coming from England, aged 98; one born in Ireland, aged 107; a native of Greenfield, aged 97; and one of Freetown with age given as 100 years.

The want of a proper occupation is undoubtedly the forerunner of pauperism, and an important cause of it. The want of an education has a significant influence, as may be seen from the subjoined table:—

Illiteracy of Paupers.

PLACE OF BIRTH.	10 TO 15 YRS. (both inc.)		ABOVE 15 YRS.		Total Illiterates.	Can not Read.	Can not Write.	Can neither Read nor Write.
	Males.	Females.	Males.	Females.				
Born in town named, . .	4	18	127	140	289	-	61	228
Born in other towns in Mass.,	4	7	105	99	215	-	106	109
Born in other States, . .	2	3	25	38	68	-	31	37
Born in England, . . .	-	-	6	19	25	-	16	9
Born in Ireland, . . .	1	5	112	251	369	-	111	258
Born in other for'n countries,	-	1	32	38	71	-	30	41
Totals, ...	11	34	407	585	1,037	-	355	682

Those who can read but can not write amount to 34+ per cent of the whole number of illiterates, and the balance, 65+ per cent, are wholly uneducated. Of the male illiterates, 116 can read but can not write, and 302 can neither read nor write. Of the female illiterates, 239 can read but can not write, and 380 can neither read nor write.

Considering the whole number of paupers, less all children under ten, and the idiotic and insane paupers above ten, we secure the following tabular result:—

SEX AND AGE.	Number of Sane Paupers.	Number of Illiterates.	Percentage of Illiterates.
Males above 10, ...	1,654	418	25+
Females above 10, ...	1,009	619	61+
Totals, ...	2,663	1,037	38+

The preponderance of illiteracy among the females is remarkable. The general result is that a little over one-third of the sane paupers, above ten years of age, are illiterate.

Comparing the native and foreign born paupers with the native and foreign born illiterates, we obtain the subjoined statement:—

PLACE OF BIRTH.	Number of Paupers. (All ages.)	Number of Illiterates.	Percentages of all Ages.	Percentages of those above 10. (Estimated.)
Native born, . . .	3,063	572	18+	30+
Foreign born, . . .	1,279	465	36+	59+

If we confine our attention to those born in Massachusetts, we find that out of 2,672 paupers, 504 are illiterate, 337 being wholly uneducated.

A more particular investigation into the place of birth of these Massachusetts born paupers discloses the town and city responsibility. In making the table which follows, the children under 10 years of age, and the idiotic and insane have been excluded. The number shown for each town indicates those persons of proper age (above 10 years) and free from mental infirmity, who were born in the towns named, and having grown up in ignorance, are now paupers in the towns in which they were born:—

Illiterate Paupers now Dependent in Towns in which they were Born.

CITIES AND TOWNS.	Males.	Females.
BARNSTABLE CO.,	16	11
Chatham, . . .	2	-
Eastham, . . .	-	1
Falmouth, . .	1	1
Harwich, . . .	7	3
Orleans, . . .	1	1
Provincetown, . .	-	1
Sandwich, . .	4	3
Truro, . . .	1	1
BERKSHIRE CO., .	4	10
Adams, . . .	-	3
Becket, . . .	-	1
Cheshire, . . .	-	1
Lenox, . . .	2	1
Otis, ...	1	-
Savoy, . . .	-	2
Sheffield, . . .	1	2
BRISTOL CO., .	10	18
Easton, . . .	3	-
Fall River, . .	-	1
BRISTOL CO.—*Con.*		
Freetown, . . .	2	4
Mansfield, . .	3	2
Rehoboth, . .	2	4
Somerset, . .	-	1
Swansea, . . .	-	1
Westport, . .	-	5
DUKES CO., . .	1	-
Chilmark, . .	1	-
ESSEX CO., . .	10	19
Amesbury, . .	-	1
Andover, . . .	1	-
Boxford, . . .	-	1
Lawrence, . .	1	-
Marblehead, . .	2	11
Newbury, . .	1	-
Peabody, . . .	3	5
Rockport, . .	1	1
West Newbury, .	1	-

Illiterate Paupers, Etc.—Concluded.

CITIES AND TOWNS.	Males.	Females.
FRANKLIN CO., .	7	4
Colrain, . . .	2	–
Conway, . . .	2	–
Erving, . . .	–	1
Gill, ...	–	1
Greenfield, . .	–	1
Leyden, . . .	1	–
Orange, . . .	1	1
Shutesbury, . .	1	–
HAMPDEN CO., .	7	15
Agawam, . . .	–	4
Blandford, . .	1	–
Brimfield, . .	2	–
Chester, . . .	1	–
Holland, . . .	–	1
Holyoke, . . .	1	–
Longmeadow, . .	1	–
Springfield, . .	–	2
Westfield, . .	–	5
West Springfield, .	1	1
Wilbraham, . .	–	2
HAMPSHIRE CO., .	1	8
Amherst, . . .	–	1
Belchertown, . .	–	4
Hadley, . . .	1	2
Prescott, . . .	–	1
MIDDLESEX CO., .	12	6
Bedford, . . .	1	–
Cambridge, . .	4	2
Chelmsford, . .	–	1
Concord, . . .	2	–
Hopkinton, . .	1	–
Lowell, . . .	1	–
Melrose, . . .	–	1
Tyngsborough, .	1	–
Watertown, . .	2	1
Wilmington, . .	–	1

CITIES AND TOWNS.	Males.
NANTUCKET CO., .	–
Nantucket, . .	–
NORFOLK CO., .	1
Quincy, . . .	–
Randolph, . .	1
Weymouth, . .	–
PLYMOUTH CO., .	11
Brockton, . .	1
Middleborough, .	2
Pembroke, . .	3
Plymouth, . .	1
Wareham, . .	4
SUFFOLK CO., .	–
Boston, . . .	–
WORCESTER CO., .	1
Ashburnham, . .	
Auburn, . . .	
Barre, . . .	
Charlton, . . .	
Dana, . . .	
Gardner, . . .	
Hubbardston, . .	
Leominster, . .	
Lunenburg, . .	
Mendon, . . .	
Milford, . . .	
Northborough, .	
Petersham, . .	
Princeton, . .	
Southborough, .	
Sutton, . . .	
Webster, . . .	
Winchendon, . .	
Worcester, . .	

Recapitulation.

COUNTIES.	Males.	Females.	Total.
Barnstable, .	16	11	27
Berkshire, .	4	10	14
Bristol, . .	10	18	28
Dukes, . .	1	–	1
Essex, . .	10	19	29
Franklin, .	7	4	11
Hampden, .	7	15	22
Hampshire, .	1	8	9

COUNTIES.	Males.	Fem
Middlesex, .	12	
Nantucket, .	–	
Norfolk, .	1	
Plymouth, .	11	
Suffolk, .	–	
Worcester, .	14	
Totals, .	94	1

The exhibit is surely not a gratifying one. Pauperism, in itself, is an evil. If a town allows its children to grow up in ignorance, and afterwards become a burden upon it, the evil is magnified. With our school facilities such an exhibit should have been impossible.

We have considered the number of paupers, the causes of dependency, and the place of birth, occupation, conjugal condition, present age and illiteracy of the dependent. We defer further remarks upon the information and lessons conveyed by the figures, until after we have made a similar presentation concerning the convict class.

CRIME.

The following table gives the whole number of convicts who were returned as being in confinement on May 1, 1875, the number of each sex being shown:—

Number and Sex of Convicts.

COUNTIES.	Males.	Females.	Total.
THE STATE,	3,578	762	4,340
Barnstable,	2	1	3
Berkshire,	64	6	70
Bristol,	175	47	222
Essex,	296	39	335
Hampden,	113	7	120
Middlesex,	291	39	330
Norfolk,	74	8	82
Plymouth,	167	214	381
Suffolk,	1,850	385	2,235
Worcester,	546	16	562

As stated in relation to paupers, this number of convicts, 4,340, is the statement for May 1, 1875, only. The county distribution of criminals is no more significant than that of paupers. The location of correctional institutions in certain towns and cities necessarily adds the criminal element to their enumeration of population.

Following the routine adopted in the case of paupers, we present a table showing the classification of convicts by place of birth:—

Birthplaces of Convicts.

PLACE OF BIRTH.	Males.	Fem.	Total.	PLACE OF BIRTH.	Males.	Fem.	Total.
In town where now convict, . . .	706	78	784	Canada, . . .	61	20	81
				Nova Scotia, . .	57	23	80
In other towns in Mass., . . .	902	96	998	New Brunswick, .	47	20	67
				Cape Breton, . .	2	-	2
Maine, . . .	129	39	168	Newfoundland, .	6	3	9
New Hampshire, .	58	16	74	Mexico, . . .	1	-	1
Vermont, . . .	20	8	28	West Indies, . .	13	-	13
Rhode Island, . .	38	7	45	South America, .	2	-	2
Connecticut, . .	38	4	42	England, . .	169	51	220
New York, . .	145	17	162	Ireland, . . .	731	309	1,040
New Jersey, . .	15	1	16	Scotland, . . .	47	20	68
Pennsylvania, . .	30	2	32	Wales, ...	5	1	6
Maryland, . .	12	3	15	France, ...	4	-	4
District of Columbia,	7	1	8	Germany, . . .	24	3	27
Virginia, . . .	48	8	56	Denmark, . . .	4	-	4
North Carolina, .	4	1	5	Holland, ...	2	-	2
South Carolina, .	6	-	6	Italy, ...	7	-	7
Louisiana, . .	4	1	5	Spain, ...	2	-	2
Georgia, . . .	1	-	1	Norway, ...	1	-	1
Mississippi, . .	1	-	1	Sweden, ...	7	7	14
Missouri, . . .	3	-	3	Portugal, . . .	2	-	2
Minnesota, . .	1	-	1	Switzerland, . .	2	-	2
Indiana, . . .	1	1	2	Finland, ...	1	-	1
Alabama, . . .	1	-	1	Malta, ...	1	-	1
Florida, . . .	1	-	1	Africa, ...	1	1	2
Texas, . . .	3	-	3	Australia, . . .	2	-	2
Ohio, . . .	7	1	8	Unknown, . . .	178	20	198
Kentucky, . .	8	-	8				
Illinois, . . .	8	-	8	Totals, . . .	3,578	762	4,340
Michigan, . .	2	-	2				

Examining this table, we find that 784 were born in the towns in the State in which they are now undergoing sentence, and that 998 are natives of other towns in Massachusetts. The state born, 1,782, form 41+ per cent of the whole number of convicts. If we include those born in other States of the Union, 701, we ascertain that 2,483 are American born, or 57+ per cent of the whole number. As in the case of paupers, we can take no account of parent nativity; nor can we say that an examination of arrests and commitments for the whole State would either sustain or change the given percentages. The report of the chief of police of the city of Boston for the year 1876 shows that of the whole number (30,041) arrested, 11,690, or 38+ per cent, were native born. In the closing part of this article we present some significant percentages which show the ratio of native and foreign born convicts to the native and foreign born population.

If pauperism is a disease of society, crime is a plague. If a knowledge of the causes of pauperism is of service in preventing its spread, a statement of the causes of imprisonment of convicts, showing the prevalence of certain forms of crime, must also be of value. In the following table the "nature of crime" is given, as nearly as possible, in the language of the schedules, the sexes being numerically presented and a classification by age included:—

Causes of Imprisonment.

	Under 10.		10 to 15.		Above 15.		Total.		
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Total.
Adultery,	-	-	-	-	45	18	45	18	63
Arson and setting fires,	-	-	2	-	33	3	35	3	38
Assault,	-	-	-	-	86	3	86	3	89
Assault and battery,	-	-	7	-	172	9	179	9	188
Assault, felonious,	-	-	-	-	39	1	39	1	40
Assault, indecent,	-	-	-	-	6	-	6	-	6
Assault on an officer,	-	-	-	-	12	-	12	-	12
Attempt to break and enter,	-	-	-	-	10	-	10	-	10
Attempt to commit murder,	-	-	-	-	-	1	-	1	1
Attempt to commit rape,	-	-	-	-	30	-	30	-	30
Attempt to commit larceny,	-	-	2	-	12	-	14	-	14
Attempt to pick pocket,	-	-	-	-	2	-	2	-	2
Attempt to rob,	-	-	-	-	2	1	2	1	3
Bastardy,	-	-	-	-	4	-	4	-	4
Bigamy,	-	-	-	-	2	-	2	-	2
Breaking and entering,	2	-	13	-	97	2	112	2	114
Breaking and entering, and larceny,	-	-	6	-	312	-	318	-	318
Burglary,	-	-	-	-	47	-	47	-	47
Burglary with intent to kill,	-	-	-	-	1	-	1	-	1
Carrying concealed weapons,	-	-	-	-	1	-	1	-	1
Circulating obscene papers,	-	-	-	-	2	-	2	-	2
Common railers and brawlers,	-	-	-	-	-	2	-	2	2
Counterfeiting coin,	-	-	-	-	2	-	2	-	2
Cruelty to animals,	-	-	-	-	2	-	2	-	2
Debt,	-	-	-	-	2	-	2	-	2
Disorderly,	-	-	-	-	2	-	2	-	2
Disobedience,	-	-	2	-	5	-	7	-	7
Disturbing a public school,	-	-	-	-	1	-	1	-	1
Disturbing the peace,	-	-	-	-	16	2	16	2	18
Drunkenness,	-	-	2	-	648	241	650	241	891
Embezzlement,	-	-	-	-	16	3	16	3	19
Escaped convicts,	-	-	-	-	3	-	3	-	3
Evading car fare,	-	-	-	-	3	-	3	-	3
Fast driving,	-	-	-	-	2	-	2	-	2
Forgery,	-	-	-	-	47	-	47	-	47
Fornication,	-	-	-	-	6	8	6	8	14
Fraud,	-	-	1	-	39	-	40	-	40
Furnishing liquor to prisoners,	-	-	-	-	1	1	1	1	2
Having burglars' tools,	-	-	-	-	1	-	1	-	1
Having counterfeit money,	-	-	-	-	1	-	1	-	1
Housebreaking,	-	-	-	-	1	-	1	-	1
Idleness,	-	-	-	-	25	14	25	14	39

Causes of Imprisonment—Concluded.

	UNDER 10.		10 TO 15.		ABOVE 15.		Total.		
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Total.
Idle and disorderly, . .	-	-	-	-	75	100	75	100	175
Incest, ...	-	-	-	-	6	-	6	-	6
Indecent exposure, . .	-	-	-	-	4	-	4	-	4
Keeping a gaming house, .	-	-	-	-	2	-	2	-	2
Keeping a house of ill-fame, ...	-	-	-	-	6	2	6	2	8
Keeping a noisy and disorderly house, . .	-	-	-	-	3	5	3	5	8
Larceny, ...	5	-	110	-	738	76	853	76	929
Lewd and lascivious persons, ...	-	-	-	-	19	7	19	7	26
Liquor nuisance, . .	-	-	-	-	13	2	13	2	15
Maiming, ...	-	-	-	-	2	-	2	-	2
Malicious mischief, . .	-	-	4	-	23	3	27	3	30
Manslaughter, . . .	-	-	1	-	48	-	49	-	49
Murder, ...	-	-	-	-	21	3	21	3	24
Neglect of family, . .	-	-	-	-	1	-	1	-	1
Night walking, . . .	-	-	-	-	-	57	-	57	57
Not given, ...	-	-	-	-	113	119	113	119	232
Obstructing railroad track,	-	-	1	-	3	-	4	-	4
Passing counterfeit money,	-	-	-	-	3	-	3	-	3
Perjury, ...	-	-	-	-	5	-	5	-	5
Prize fighting, . . .	-	-	-	-	1	-	1	-	1
Procuring abortion, . .	-	-	-	-	3	-	3	-	3
Profanity, ...	-	-	-	-	1	-	1	-	1
Polygamy, ...	-	-	-	-	5	3	5	3	8
Rape, ...	-	-	-	-	16	-	16	-	16
Receiving stolen goods, .	-	-	1	-	20	7	21	7	28
Rescuing a prisoner, . .	-	-	-	-	3	3	3	3	6
Robbery, ...	-	-	-	-	123	2	123	2	125
Runaways, ...	-	-	-	-	1	-	1	-	1
Sodomy, ...	-	-	-	-	3	-	3	-	3
Stealing a ride, . . .	-	-	-	-	4	-	4	-	4
Stubbornness, ...	-	-	12	-	38	1	50	1	51
Stubbornness and disobedience, ...	-	-	18	-	9	4	27	4	31
Threatening bodily harm, .	-	-	-	-	4	1	4	1	5
Transferred from State Primary School, . .	-	-	2	-	-	-	2	-	2
Truancy, ...	7	-	95	3	5	-	107	3	110
Vagrancy, ...	5	1	63	4	137	50	205	55	260
Violation of city ordinance,	-	-	-	-	3	-	3	-	3
Violation of license law, .	-	-	-	-	17	-	17	-	17
Violation of Sunday law, .	-	-	-	-	1	-	1	-	1
Totals, . . .	19	1	342	7	3,217	754	3,578	762	4,340

But 232, or 5+ per cent, failed to give the causes of imprisonment, and the presentation may be regarded as a complete one in this respect. Upon examining the crimes specified, we find that assault (335), breaking and entering, including burglary (479), drunkenness (891), larceny (929), robbery (125), and truancy and vagrancy (370), represent 3,129 crimes, or 72+ per cent of the whole number. If we analyze the crimes as returned, omitting the 232 "not given," we secure the following condensed statement of causes of imprisonment:—

Crimes against the person,	476, or 11+ per cent.
Crimes against property,	1,771, or 43+ per cent.
Violations of law and order,	1,861, or 45+ per cent.

The children under 15 number 369, or 8+ per cent of the whole number.

In the subjoined table will be found the classification of the occupations of convicts before incarceration, as called for by the special instruction sheet previously referred to:—

Occupations of Male Convicts.

Actor,	1
Artist,	1
Bakers,	11
Barbers,	24
Bartenders,	3
Blacksmiths,	16
Bleacher and presser,	1
Boiler makers,	3
Bookbinders,	3
Book-keepers,	2
Boot and shoe makers,	115
Brakemen,	3
Brass worker,	1
Bricklayers,	3
Brush makers,	4
Butchers,	3
Cabinet makers,	7
Calico printer,	1
Calker,	1
Carpenters,	30
Carriage maker,	1
Carriage painters,	4
Carvers,	7
Chair makers,	3
Chair cane seaters,	235
" " 10 to 15 yrs. of age,	89
Cigar makers,	2
Clerks,	2
Collier,	1
Comb maker,	1
Cooks,	4
Core makers,	2
Curriers,	5
Dresser,	1
Dyers,	3
Engineers,	5
Engineer, civil,	1
Engraver,	1
Factory laborers,	2
Factory operatives,	43
Farmers,	30
Firemen,	4
Fishermen,	7
Furniture dealer,	1
Gardeners,	4
Gas fitters,	2
Glass blower,	1
Glass worker,	1
Gunsmith,	1
Hackman,	1
Hairdresser,	1
Harness makers,	3
Hatters,	3
Horse shoer,	1
Hostlers,	11
Hotel keeper,	1
Huckster,	1
Iron puddlers,	2
Iron worker,	1
Jewellers,	4
Junk dealer,	1
Laborers,	220
Lather,	1
Lawyer,	1

Occupations of Male Convicts—Concluded.

Liquor sellers,	4
Machinists,	27
Mariners,	19
Masons,	10
Masons, stone,	3
Merchants,	2
Miner,	1
Morocco dresser,	1
Moulders,	15
Moulder, stereotype,	1
Painters,	39
Paper hanger,	1
Pattern finisher,	1
Paving cutter,	1
Pedlers,	5
Physicians,	3
Plasterers,	5
Plumber,	1
Porter,	1
Printers,	3
Pugilist,	1
Railroad workman,	1
Sailmakers,	3
Salesman,	1
Saloon keepers,	5
Scene painter,	1
Shoe dresser,	1
Shoe fitter,	1
Silversmith,	1
Skate maker,	1
Slaters,	4
Soap makers,	2
Soapstone worker,	1
Steam fitters,	2
Stone cutters,	7
Tailors,	3
Teamsters,	12
Telegraphist,	1
Tinplate workers,	3
Tinsmiths,	9
Trader,	1
Trunk makers,	2
Turner,	1
Upholsterers,	4
Varnishers and polishers,	4
Waiters,	5
Watchman,	1
Whitesmith,	1
Whitewasher,	1
Wood sawyer,	1
Wood turners,	2
Wood worker,	1
Not given,	2,131
" " under 15 yrs. of age,	272

Occupations of Female Convicts.

Cooks,	2
Factory operatives,	21
Housekeepers,	13
Housewives,	21
Housework,	2
Laundresses,	18
Liquor seller,	1
Nurses,	4
Sewing-machine operators,	8
Seamstresses,	10
Servants,	74
Not given,	580
" " under 15 yrs. of age,	8

The result of the above tabulation is far from being satisfactory. Out of a total of 4,340, those returning no occupation number 2,991, or 68+ per cent. This is, to some extent, the result of defective or careless enumeration. In one case, at least, that of 324 male chair cane seaters, the *present* occupation was returned instead of that followed previous to incarceration. The great variety of professions and trades represented in the list of occupations shows, as in the case of paupers, that no particular branch of labor supplies a noticeable proportion of criminals.

The succeeding presentation of the conjugal condition of convicts is vitiated in value by the great proportion of "unknown." This deficiency, and others in the previous presentations, was caused by the real or professed inability of the heads of several large institutions to supply the information, they not having complete records, and it being considered prejudicial to discipline, and well nigh impossible, for the enumerator to gain the information by personal inquiry of each pauper and convict. Could this have been done, the returns would undoubtedly have been complete and of great value.

Conjugal Condition of Convicts.

CONJUGAL CONDITION.	Males.	Females.	Total.
Single,	1,895	332	2,227
Married,	621	356	977
Widowed,	8	19	27
Divorced,	2	–	2
Unknown,	1,052	55	1,107
Totals,	3,578	762	4,340

In the case of the females, the married show a very slight excess over the single. Undoubtedly the greatest number of male convicts are single.

We now present a companion table to that given for paupers, showing the ages of convicts at the time the census was taken,—May 1, 1875.

Ages of Convicts.

AGE.	Males.	Females.	AGE.	Males.	Females.
8 years,	1	–	13 years,	70	18
9 "	16	–	14 "	81	1
10 "	33	1	15 "	58	1
11 "	49	2	16 "	127	14
12 "	53	2	17 "	133	10

Ages of Convicts—Concluded.

AGE.	Males.	Females.	AGE.	Males.	Females.
18 years, . .	178	23	50 years, . .	46	13
19 " . .	187	29	51 " . .	12	–
20 " . .	154	34	52 " . .	12	4
21 " . .	186	32	53 " . .	18	2
22 " . .	174	27	54 " . .	7	1
23 " . .	142	26	55 " . .	17	8
24 " . .	133	27	56 " . .	12	2
25 " . .	117	29	57 " . .	5	3
26 " . .	106	28	58 " . .	9	2
27 " . .	84	34	59 " . .	7	2
28 " . .	105	32	60 " . .	26	6
29 " . .	90	29	61 " . .	3	1
30 " . .	102	36	62 " . .	3	1
31 " . .	73	19	63 " . .	6	–
32 " . .	94	23	64 " . .	10	1
33 " . .	72	25	65 " . .	9	–
34 " . .	68	16	66 " . .	4	2
35 " . .	99	46	67 " . .	5	2
36 " . .	82	13	68 " . .	3	–
37 " . .	62	17	69 " . .	1	–
38 " . .	44	15	70 " . .	8	1
39 " . .	48	13	71 " . .	1	–
40 " . .	76	33	72 " . .	–	–
41 " . .	38	5	73 " . .	1	–
42 " . .	33	15	74 " . .	–	1
43 " . .	28	10	75 " . .	4	–
44 " . .	18	5	76 " . .	–	–
45 " . .	52	1	77 " . .	–	–
46 " . .	21	6	78 " . .	–	1
47 " . .	18	4	Unknown, .	3	1
48 " . .	27	4			
49 " . .	14	3	Totals, . .	3,578	762

If we consolidate the ages given by periods, we obtain the following presentation :—

PERIODS OF AGE.	MALES.		FEMALES.		TOTAL.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
15 years and under, . .	361	10+	8	1+	369	8+
16 to 21, both inclusive, .	965	27+	142	18+	1,107	25+
22 to 40, both inclusive, .	1,771	49+	488	64+	2,259	51+
41 to 60, both inclusive, .	420	11+	113	14+	533	12+
Above 60 years, . . .	58	1+	10	1+	68	2+
Totals, ...	3,575	–	761	–	4,336	–

The "unknown," only 4 in number, are omitted from the above. It will be remarked that 33+ per cent of the convict class are 21 years of age or under. More than one-half the criminals are between 22 and 40 years of age. In considering this question, we must take into account the fact that many have been in prison for a length of time and were younger when sentenced. This circumstance would necessarily increase the number of those 21 or under, and make more apparent the prevalence of crime among minors. This exhibition of juvenile delinquency naturally leads us to the consideration of the want of education among convicts. The *status* of those in prison, May 1, 1875, as regards illiteracy, is shown in the following table:—

Illiteracy of Convicts.

PLACE OF BIRTH.	ABOVE 15 YEARS.		Total Illiterates.	Can not Read.	Can not Write.	Can neither Read nor Write.
	Males.	Females.				
Born in town named,	23	7	30	-	4	26
in other towns in Mass.,	50	4	54	-	24	30
in other States,	66	19	85	-	12	73
in England,	21	13	34	-	5	29
in Ireland,	141	75	216	-	27	189
in other foreign countries,	35	10	45	-	7	38
Totals,	336	128	464		79	385

No children under 15 were reported as being unable to read and write. Those able to read, but unable to write, form 17+ per cent of the whole number of illiterates, and those unable to either read or write 82+ per cent. Of the male illiterate convicts, 64 can read but can not write, and 272 can neither read nor write. Of the female illiterates, 15 can read but can not write, and 113 can neither read nor write.

Considering the whole number of convicts, less the children under 15, of which none were returned as illiterate, we arrive at the amount of illiteracy in the convict class.

SEX AND AGE.	Number of Convicts.	Number of Illiterates.	Percentage of Illiterates.
Males above 15,	3,217	336	10+
Females above 15,	754	128	16+
Totals,	3,971	464	11+

The general result, as drawn from the above, is that a little over one-tenth of the convicts above 15 years are illiterate.

If we compare the native and foreign born with the native and foreign born illiterates, the result is as follows:—

PLACE OF BIRTH.	Number of Convicts. (All Ages).	Number of Illiterates.	Percentages of all ages.	Percentages of those above 15. (Estimated.)
Native born,	2,483	169	6+	7+
Foreign born,	1,857	295	15+	17+

Out of 1,782 convicts born in Massachusetts, 84 are illiterate, 56 being wholly uneducated.

Remarks.

It is proper for us to state, by way of preface to our contemplated general remarks concerning the previously presented statistics, that the only object of this article is to give information upon certain points which are not obtainable through other channels.

The annual reports of the board of state charities, and of the prison commissioners, contain the full and official figures relating to the population, cost of support, etc., of our charitable and correctional institutions. The social statistics which we present in relation to their inmates are supplementary, not comparative. The information gained gives an earnest of what could be learned by a system of complete registry. We desire to acknowledge here the constant and satisfactory use we have made, in the preparation of this article, of the various reports of the board of state charities.

and of the prison commissioners. Gov. Rice, in his inaugural address delivered January 4, 1877, thus succinctly stated the work of these two branches of the government:—

"Of the revenues annually expended by the Commonwealth (after deducting one-fifth, which goes to pay interest on the public debt and the charges thence accruing), it will be found that nearly a quarter part is paid in public charity or for the execution of the penal laws and the maintenance of prisons. Few persons are aware of the full extent of this department of the state government, or of the manifold interests which it includes and provides for. Massachusetts supports asylums for the blind, the insane, the deaf-mute, the idiotic, the inebriate; schools for the young of these classes, for paupers and for juvenile delinquents; prisons of three or four grades; hospitals for most maladies; almshouses, public and private, and charitable societies of every kind. We have two distinct systems of public relief for the poor: one administered by the State in six or seven establishments, containing hundreds of inmates, the other administered by three hundred and forty-two cities and towns, in two hundred and twenty almshouses, and in thousands of private families where the poor are supported or aided. The aggregate outlay for public and private charity is very large, amounting to *four and a half millions* of dollars paid during the year 1876. Less than a third part of this amount is paid from the state treasury; but something more than a third part is paid by the cities and towns, and over all the public expenditure the State authorities exercise some supervision."

Having thus shown the scope of other branches of the government and defined the nature and object of the information which we have gathered, we shall proceed to consider these social statistics of paupers and convicts in a general way.

The Number of Paupers and Convicts.

As previously stated, the number of paupers considered in the tables was the number receiving full support on the first of May, 1875. This class of paupers is variable, being naturally larger in winter than in summer. The board of state charities failed to obtain perfectly reliable figures relating to "partial support" for 1876, the officers reporting to it being forced to rely upon estimates in many cases. It gives the grand aggregate of all classes reported as having been supported or relieved within the year, by town, city or state officers, as 283,476. This number is divided into full support, 7,749; partial support, 65,988; Boston lodgers, 60,803; and vagrants and travellers, or "tramps," 148,936. Making allowances for undoubted duplications, the secretary of the board says, "Probably not more than 80,000 or 85,000 different persons are represented in the grand aggregate of all classes." Comparing 4,342, the number of full support paupers, with 1,651,912, the population of the State, we find the proportion to be one in 380 of the population. Of the whole number, 4,342, the children 15 years of age and under number 27 per cent. By the census of England and Wales, for 1871, the number of full support paupers was found to be 156,430, or one in 153 of the population. The children numbered 33 per cent. The above indicates about two and one-half full support paupers in England and Wales to one in Massachusetts. Taking the number, 85,000, as indicating the whole number of persons in the State receiving aid for any length of time, we ascertain the proportion to be, one such in every 19 of the population. By the census of England and Wales, the corresponding number was found to be 1,037,360, or one in every 23 of the population. The number of full support paupers in Massachusetts has been steadily increasing since 1861, as shown in the report of the secretary of the board of state charities for 1876. On the other hand, the figures for England and Wales for the years 1861 and 1871, show a slight proportional decrease, one in 160 as compared with one in 153, in favor of the latter year.

We are prone to bewail the condition of the English laborer and lament the existence of pauperism in England, but the official figures, certainly, do not warrant much self-gratulation. It may be that English private benefactions far exceed our own in amount, but the fact remains that the English government aids fewer paupers, proportionately to population, than our own. The number of vagrants, or tramps, has increased largely in the State in the past few years. In 1873, the cases of relief of vagrants numbered 45,653; in 1874, 98,263; in 1875, 137,308; and in 1876, 148,936. These figures, of course, do not represent so many *different* persons; one active tramp, no doubt, manages to be relieved and reckoned a great many times in the course of a year, by travelling from one town to another and seeking aid in all. Of the number in 1876, 63,000 were lodgers at the Boston police station houses, 51,000 being non-residents of the city. Only beds for the night, in warm rooms, were supplied to these travellers, the chief of police of the city of Boston stating that only 94 pints of soup, as food, were supplied to the whole number. Where they did obtain their food still remains a mystery.

The number of convicts, 4,340, undergoing imprisonment on the census day, May 1, 1875, supplies a proportion of one convict in 380 of the population, being the same ratio as in the case of paupers. By the census of England and Wales for 1871, the number of convicts incarcerated was found to be 28,756, or one in 790 of the population. This indicates two and one-tenth convicts in Massachusetts to one in England and Wales. These figures furnish food for reflection; but the nominal character of the offences for which a great many of our convicts are incarcerated should be borne in mind, for many crimes in Massachusetts are simply misdemeanors in England. The number of commitments to the prisons of Massachusetts for 1876 amounted to 16,700 *different persons.* This shows a criminal class with a representation of one in 98 of the population. The "Judicial Statistics" of England and Wales for 1872, stated that the convicts in prison numbered 30,913 and the *suspected* criminal class, at large, 46,877, a total of 77,790, or one in 291 of the population.

The following table shows the relative number of female paupers and convicts in this State and in England and Wales:

CLASSIFICATION.	Males.	Females.	Totals.
Massachusetts "full support" paupers,	2,388	1,954	4,342
England and Wales "full support" paupers, ...	79,968	68,323	148,291
Massachusetts convicts in prison, .	3,578	762	4,340
England and Wales convicts in prison,	23,475	5,281	28,756

In Massachusetts, 31+ per cent of both paupers and convicts are females; in England and Wales, 41+ per cent.

Place of Birth of Paupers and Convicts.

We have seen, previously, that of the full support paupers 70+ per cent, and of the convicts 57 per cent, were American born. We included as "Americans" all persons born in this country. We can not see how the fact of a native born child having a foreign born father or mother, or both, can render that child other than an American citizen. From a comparison between the paupers and convicts born in various places, and the whole number of the population born in the same places, we derive the following interesting tables:—

Paupers.

PLACE OF BIRTH.	Population.	No. of Paupers.	Proportion: One in—
Born in Massachusetts,	973,011	2,672	364
Born in other States,	252,818	391	646
American born (total),	1,225,829	3,063	400
Born in Ireland,	234,556	901	260
Born in England,	49,139	100	491
Foreign born (total),	418,904	1,203	348

Convicts.

PLACE OF BIRTH.	Population.	No. of Convicts.	Proportion: One in—
Born in Massachusetts,	973,011	1,782	546
Born in other States,	252,818	701	360
American born (total),	1,225,829	2,483	453
Born in Ireland,	234,556	1,040	225
Born in England,	49,139	220	223
Foreign born (total),	418,904	1,659	252

The truth stands out plainly in these tables. Those born in other States supply the smallest quota of paupers; and those born in Massachusetts, of convicts. The foreign born furnish one pauper to 348, and the American born one to 400; a slight variation in favor of the native born. As regards crime, the foreign born supply one convict in 252, and the

American born one in 453; a showing decidedly in favor of the native born. In connection with this presentation, the following from the report of the board of state charities for 1876 is pertinent:—

"Frequent allusion has been made by the officers of the board, in previous reports, to the great expense incurred by Massachusetts for the support of lunatics and paupers belonging to neighboring States and the British Provinces. This, in their judgment, equals the annual cost of at least one public institution; it has forced upon Massachusetts the otherwise needless construction of a fourth lunatic hospital, and has already compelled our tax-payers to assume the annual payment, in interest alone, of $100,000; while the yearly expenditure for partial relief and full support can hardly fall short of $60,000. Our own laws in regard to the removal of strangers, could they be thoroughly executed, are sufficient to relieve us of this yearly burden of support; but we have at once to encounter the adverse legislation of adjoining States which impose severe penalties upon all who assist in returning to their homes and places of legal settlement therein, citizens of those very States who may have fallen into distress without their borders."

The Boston chief of police, in his report for 1877, does not distinguish the inhabitants of other States. Out of 63,726 "lodgers," 22,099 were American born, 3,022 were born in the British Provinces, 456 in Canada, 29,589 in Ireland, 4,916 in England, and 1,836 in Scotland. The whole number of foreigners was 41,627. In a total of 30,041 arrests, 11,690 were American born, 1,047 were born in the British Provinces, 103 in Canada, 14,578 in Ireland, 1,068 in England, and 312 in Scotland. The foreigners numbered 18,351. About two-thirds of the arrests resulted in commitments for trial.

In connection with our present subject, the question of immigration demands a passing notice. In 1876, 8,118 immigrants arrived at the port of Boston. From May 10, 1848, to October 1, 1876, the total arrivals numbered 458,637. Of this number, Ireland furnished 227,982, England, 87,308, the British Provinces, 72,572, Scotland, 10,192, and Wales, 2,135; a total of 400,189, or about eight-ninths of the whole number. The non-productive class among these immigrants numbered more than 100,000, or one to every three and one-half workers; a heavy burden to support in a new country, and undoubtedly often the cause for asking private and public aid.

Causes of Pauperism and Imprisonment.

By a reference to page 191, it will be seen that of the full support paupers the majority are sick, afflicted with blindness, deafness, insanity, etc., or have been made paupers by acts of others. The intemperate paupers show the need of practical reform work. With this exception, the full support paupers seem to be a helpless class, whose condition of dependency is unpreventable, and for whom the State or individuals must provide. There are no statistics relating to those who make requests for partial support; nor is there any means of telling how many of the army of tramps are workingmen out of employment, and how many are self-inclined vagabonds. If the "pauper disfranchisement" bill should become a law, its execution, with a system of registry, might settle these points by separating the deserving laborer from the undeserving shirk—the real "tramp."

The officers in charge of the charitable institutions seem to have weeded the ground carefully and thoroughly, and the number of able-bodied paupers receiving full support must be inconsiderable. The situation here is not dissimilar to that in England in 1871. The introduction to the census of England and Wales for 1871 says, "The only prospect of any material reduction of the burden of pauperism would seem to arise out of the possibility of diminishing the number of adult able-bodied paupers (indoor and outdoor) in receipt of relief." If we in Massachusetts have diminished the number of able-bodied paupers to a minimum, and are doing everything possible to remove the children from the pauper institutions, and make them self-supporting, we are doing the best that can be done, and must bear the remaining burden with equanimity, it being a necessary infliction. Whether the intemperate pauper must be considered a necessity, the work of temperance reform must decide. The contemplation of the number so incapacitated for self-support, and the consequent public burden they have become, form a strong argument in favor of both suasion and prohibition.

The causes of imprisonment are fully set forth on page 204. The crimes against the person form 11+ per cent, against property 43+ per cent, and against law and order, 45+ per cent. Other statistics tend to confirm this showing. The state detective force in 1876 made 530 arrests. Of these, 52 were for offences against the person, 300 against property, and 178 against law and order. The Boston police made 30,041 arrests in 1876. Those for crimes against the person numbered 3,228, against property, 3,015, and against law and order, 23,798, the latter number being 79+ per cent of the whole number. The following selection, made from the report of E. H. Savage, chief of police of Boston, does much to explain the large number of arrests in that city; and the argument therein contained has, undoubtedly, an application throughout the State:—

"The Catalogue of Crime.

"In turning to the catalogue of crime as presented in this report, the first item that meets the eye is 'Arrests, 30,041.' Thirty thousand persons arrested in Boston in one short year! To him who looks on the dark side of human life this is a sad showing, and he will be likely to turn away with the remark, "Truly the world in general is growing bad, very bad, and Boston in particular is a very wicked city.' Indeed, some very good and learned people, starting from this point, seem to have convinced themselves that for vice and crime Boston is without a parallel.

"If we pursue the inquiry further in relation to the nature of crime committed, as set forth in the catalogue, we find that more than two-thirds of the number of arrests are included in four offences called misdemeanors; viz., drunkenness, simple assaults, disorderly and suspicious persons, and that less than one-fifteenth of the crimes charged are of a nature called felonious. I say charged, because when a person is taken into custody for crime, it is the duty of the officer making the arrest to record the same, and make complaint against the prisoner for the highest crime of which there is reasonable evidence to prove him or her guilty; but party guilty of a less offence, and render such verdict as the trial may justify; but in no case can a verdict be rendered of a higher crime than the one charged: for instance, a person may be charged with murder; a coroner's inquest and a grand jury may find a true bill, and at the subsequent trial he may possibly be found guilty of murder; but the verdict is more likely to be manslaughter, felonious assault, simple assault, or justifiable homicide; or he may be set at liberty without trial, some one else having confessed the crime; but, in either case, the charge on the record of the arresting officer must stand as first made; and similar cases often occur in all classes of crimes and misdemeanors for which arrests are required to be made. This, with the large number of arrests for violation of the city ordinances, for insanity and delirium tremens, and for other causes that cannot properly be classed as misdemeanors, together with those in custody as deserters, runaways, detained witnesses, etc., will reduce not only the magnitude of crimes charged, but also the number of criminals, very essentially from what may at first view appear in the catalogue; and if it may prove that the police of Boston reap their field a little closer, or that the press spread their 'locals' a little broader than in other cities, it should not be taken as evidence that our people are more wicked."

The Boston statistics are so complete and instructive that the need of similar exactness in State records becomes self-evident.

The arrests for drunkenness in Boston in 1874 numbered 11,880; in 1875 they decreased to 10,325; and in 1876 they fell to 8,564. The average amount of property stolen yearly, from 1870 to 1876 inclusive, amounted to only $\frac{1}{86}$ of 1 per cent of the average valuation of personal property, and the greater part of it was recovered.

Occupations of Paupers and Convicts.

The question of occupations, in the case of both paupers and convicts, is a twofold one. The occupations of paupers before they become such, and of convicts before incarceration, form one side; their occupation while in the almshouses or prisons, the other. It can not be claimed that any very desirable working material can be found among our paupers and convicts. If we except the large number that are unable to work, we shall, by no means, find workers remaining. We shall find some with trades, able and ready to work, but the greater number unpossessed of a self-supporting occupation, and many unwilling to work. We believe that the unfitness for productive labor, whether it springs from lack of a trade or occupation, or from personal antipathy to work, is a great and predisposing cause of both pauperism and crime. This is not the place for a homily on the dignity of labor; but the fact is, no man is realizing his capacity of enjoyment unless he has some congenial occupation, which should also support him. All can not arrive at that happy state, for the drudgery of life must be done by some; but it is pure selfishness which sets apart any class of men to such labor. We all know that our young men have a great indisposition to physical labor, for the pick and the shovel, the spade and the hoe savor of derogation. We believe in that kind of compulsory education that will fit a man for work and self-support. The right of the State to compel a man to train his eye so that he can read and his hand so he can write, will not be seriously questioned, and we hope will soon be seriously insisted upon. The State, then, surely has a right to compel a man to so train both eye and hand that he can support himself and others, and free the State from the burden of his support unless in exceptional and well understood cases.

The true claim of an able-bodied man upon a community is not for support, but for a chance to support himself; and if one community will not or can not furnish him this, he should try another. No able-bodied pauper should be supported in idleness while so many waste places are waiting cultivation. The English colonization societies furnish free passes only to desirable colonists; that is, men and women who know how to work and mean to work. What opening then for the tradeless pauper or convict unless he is taught how to work, and the necessity shown?

We have already stated that the able-bodied paupers supported by public charity are doubtless very few in number, and of those partially supported the workers have not been separated from the drones. The warden of the state prison says, in his last report, that of 220 men sentenced during 1876, 147 were without a trade or any regular means of earning a living. Will those men serve their time and be discharged in their present unfit state to battle with the world? They may go out into society again resolved to do right, but without a reliable means of support they are ill-prepared to meet the adversities of hard times, or the temptation to gain by crime what they do not know how to obtain by honest labor.

Conjugal Condition and Ages of Paupers and Convicts.

We have remarked the nearly equal division of paupers into married and single, and have considered their ages in reference to productive labor. We repeat, that the full support paupers of the State are nearly a helpless burden. The criminals are mainly single, and 84 per cent of them are under 40 years of age. The conjugal condition of paupers and convicts was not separately reported in the English census. Of the full support paupers in England and Wales, on the census day in 1871, 48,228 were under 15 years of age; between 15 and 40 years, 28,747; between 40 and 70, 44,462; above 70 years, 26,854; 501 were returned as aged 90 and upwards, and 21 were said to be centenarians. These figures supply some comparisons with those given for Massachusetts. The ages of criminals were not given separately. The Registrar General speaks of the prison statistics being "necessarily meagre." He continues: "But the evils and burdens inflicted upon society by the criminal classes are so great that no labor would be ill-bestowed in the collection of full and accurate information respecting them, as the basis of measures calculated to thin their ranks, whether by improved penal and reformatory discipline or by preventive agencies."

He further says, speaking of the annual volumes of "Judicial Statistics," that an examination of the tables shows "a falling off in the class of habitual criminals, and a diminution of offenders under 20 years of age, indicating the success of the measures taken to rescue and intercept those who would otherwise be the recruits of the ranks of crime." The necessity of a complete registry, in connection with other points, of the conjugal condition and ages of Massachusetts paupers and convicts would seem to be as urgent here as in England.

Illiteracy of Paupers and Convicts.

We have seen that 38 per cent of our full support paupers and 11 per cent of our convicts are illiterate. For this state of affairs there is but one remedy — education, and that *compulsory education.* This alone will remove one "cause" of pauperism and crime, and oblige the illiterate pauper and convict to improve his condition in this respect. The criminals are much better educated than the paupers. They need to be, to be successful in crime. Of the 220 convicts sent to the Charlestown State Prison in 1876, only 21 were unable to read and write; yet 147 were without a trade. No stronger testimony in favor of compulsory education could be cited than the fact that 242 persons were born in Massachusetts, grew up unable to read or write, and are now paupers in the towns where they were born. It seems like retributive justice that the burden has fallen in the proper place, and that those towns which failed to make citizens have made first-rate paupers.

Cost of Pauperism and Crime.

The census of England and Wales, for 1871, gives the amount expended in relief to the poor in the year ending Lady Day (March 25), 1871, as £7,886,724 or at the rate of 6*s.* 11¼*d.* per head of the population. This would be about $1.75 currency, of our money.

The amount spent in 1876, by towns, cities and this State, for charitable purposes, was $1,631,011, or 98 cents per head of the population. The amount spent for the *care* alone of criminals, was $1,000,000, or 60 cents per head. This sum, $2,631,011, was about one-tenth of the whole amount raised by taxation. About one-fifth, or $5,000,000, was spent for the support of schools. The sum given as expended for purposes of charity, reform or correction was only the public outlay. Individual benefactions can not even be estimated. The interest on the value of pauper establishments is not included, neither are the cost of prisons, interest on value of same, outlay for police (Boston spends $850,000 yearly on its police force), cost of judiciary, etc., taken account of. The pauper establishments, with their helpless inmates, are nearly a clear outlay. The prisons cost $575,000 to run them in 1876, and convict labor brought $141,000, or less than one-fourth of the cost of food, clothing and attendance. The average weekly cost of a convict, in 1876, was $2.07. His labor in the state prison will bring the State from 40 to 90 cents per day. In Hampden County, convict labor has been secured by contract, for slipper making, at *three cents* per day. The exact burden placed indirectly upon the laboring man by the necessary taxation for the support and care of paupers and convicts can not be definitely stated.

The efforts of society at large, as regards pauperism and crime, must be directed, of course, in such a way as to secure a decrease in the number of both paupers and convicts. When men and women have become inmates of almshouses or prisons, then the authorities have to deal with them as a fact. Measures of prevention have failed, and measures of relief, correction and reform become necessary. There can be no doubt that education is the best weapon with which to fight both pauperism, in all its forms, and crime. But it is not simply education of the mind that will work the cure. The "gospel of work" must be taught as well, and no pauper or convict is fitted to leave the care of the State until he is able to work and secure a living. A workingman who labors and pays his way, though he be unable to read or write, is a better member of society than those mentally educated individuals who will not work, or those who do not know how to earn their living. What society fails to do in the way of book or work education for paupers and convicts should be made up by the authorities when the individuals come under their control. As bearing upon this subject, we quote the following opinions expressed in a late number of "Harper's Weekly":—

"There are two important bills pending in the Legislature of New York, the principles of which are of general application. One bill provides for the indefinite sentences of criminals convicted of offences punishable by imprisonment in the state reformatory, and the other provides for the custody and reformatory treatment of vagrants. Prison discipline and pauperism are subjects upon which the progress of civilization throws immense light. They are susceptible of the most careful scientific observation and treatment; and no sign of the times is more encouraging than the comprehensive study which is devoted to them by intelligent and capable persons. The first step in reformation of any kind is the awakening of self-respect. And in the criminal classes nothing tends to this more surely than the perception of the offender that he is not regarded as a wild beast, but that there are human hope and sympathy even for him. But the science of prison discipline, so to speak, and of the treatment of pauperism, is far from sentimental in the hackneyed sense of that recently abused word. It often seems, on the contrary, to be hard and stern. Thus it totally prohibits street almsgiving, or any giving whatever, without careful inquiry.

"The principle of the prison bill which we have mentioned is that of imprisonment dependent upon good behavior. The courts sentencing offenders to the state reformatory at Elmira shall not 'fix upon, state, determine or limit the duration' of the punishment. The managers may send to the state prison any prisoner who was more than thirty years old at the time of his conviction, or who has been previously convicted of crime, and any incorrigible prisoner whose presence is seriously hurtful to the others. The object of the imprisonment is to prevent the prisoners from committing crime, to secure their self-support and to accomplish their reformation. The managers are to establish a system of marks, under which every prisoner is to be credited with good conduct of all kinds and charged for all offences and negligences; and they are to release any prisoner when they are satisfied that there is a strong or reasonable probability that his release will not be incompatible with the welfare of society. The managers may also permit prisoners to go out upon parole under suitable rules, the managers still retaining custody and supervision. This is a plan which has been adopted in England and Ireland and with great success. It is obviously most reasonable, and it is approved by those who have carefully studied the subject.

"The other bill provides substantially that tramps or vagrants shall support themselves and reduce their numbers. In every judicial district, except the first, a board of seven managers, to be appointed by the governor, and with no salary but their actual necessary expenses while engaged in their duties, are to hire proper buildings and lands suitable for the employment of vagrants, and under all circumstances the sexes are to be rigorously separated. No vagrant is hereafter to be committed to any poorhouse, jail or other place of confinement save these district buildings, except by the written request of the attorney of the county. This bill thus provides a system of workhouses, and will unquestionably steadily diminish the volume of tramps that is pouring through the State. Vagrancy is incipient criminality. It has increased alarmingly within three or four years. And unless vigorous and intelligent measures are adopted, pauperism will become a hereditary curse upon our soil. The details of such a bill are, of course, to be carefully guarded, and they seem to us to be so.

"The objection that district workhouses will add to the public expenses is well answered by practical and experienced students of the subject of pauperism, both men and women, the managers of the state charities' aid association, whose opinion upon such a subject may well be regarded as conclusive. They show the mistake of the supposition that the bill proposes increased expense; for it provides for the transfer of vagrants from the county jails, where they spend their time in idleness and a school of crime, to a workhouse, where they will be compelled to support themselves. The counties will thus be relieved of the maintenance of thousands of the idle and vicious while they are undergoing punishment. Moreover, a reformatory treatment will be pursued in the workhouses, and a certain part of the inmates will thus be made self-supporting. Again, the proposed discipline will become very irksome to incorrigible vagrants, who will naturally go elsewhere; and the actual expense of establishing the workhouses will not be great, since the members of the board of managers will receive no salaries, and the bill provides only for the hiring of buildings and the purchase of furniture, tools and raw material for the employment of the inmates. The plan can hardly fail to be heartily approved by all tax-payers as soon as it has a fair trial; for while it will not be felt in taxation, its indirect economy is obvious.

"There can not be two more significant bills than both of these. Their passage would be emphatically wise legislation. It would show that the State of New York is not unmindful of the results of experience upon the two great subjects involved in the bills; that it means to reform as well as to punish its criminals, and to check the extension of pauperism."

It must not be presumed that our State authorities are not moving in the matters referred to in the preceding extract. The officers of the board of state charities recommend the reorganization of their department, and point out the opportunities for desirable and money-saving changes in the State's method of bestowing public charity. In speaking of the system of county prisons, which has existed since 1834, the secretary of the board says:—

"Our county prison system is quite unsatisfactory in its results, as was said last year, whether regard be had to the financial or the reformatory aspect. It is very expensive, and it does not reform. Whatever changes may be brought about by patient and persistent effort, it can not be made satisfactory to those who clearly see what should be accomplished by imprisonment for offences against social order; and we shall not bring about such results from our minor prisons as we ought to reach, till we abolish the present system, and substitute for it one based on the principle of state control."

The failures of our prison system are stated above to be of a financial and reformatory nature. That is, the convicts sentenced to hard labor are not obliged to work, because they have no work to do, and consequently their support is a clear burden. Besides, the convicts themselves get no education in labor, and leave the prison as unfitted for work as when they entered it. The prison commissioners credit the county officers generally with "energetic efforts, in the face of great difficulties, to employ prisoners sentenced to labor." In another part of their report they speak of the convicts standing around "listlessly," with nothing to do. It seems to be the growing opinion of well informed parties, that all the charitable and correctional institutions in the State should be under immediate State control, the executive officers in both departments having full powers, and being freed from all the vexations which result from having a system within a system.

A decided step in this direction was made by an order of the last Legislature, which directed the prison commissioners to consider the expediency of dividing the State into prison districts, looking, of course, to the abolition of all county and municipal prisons.

The commissioners report to the present Legislature. The first section of the bill, prepared by them, reads as follows:—

"The Commonwealth is hereby divided into seven prison districts, in each of which shall be kept and maintained by the Commonwealth, a house of correction and a workhouse. All persons sentenced, in any prison district, to confinement in the house of correction or workhouse, shall serve out the sentence in the house of correction or workhouse in that district."

It has been found impossible to exert any reforming influence, or secure any remunerative labor from those persons convicted of light offences and sentenced to short terms of imprisonment. An officer of a Boston house of correction mentions the case of one man serving *eleven* thirty day sentences in one year! Section five, of the proposed bill, proposes a longer stay for certain classes of offenders. We present it below:—

"All persons convicted as common drunkards, or as vagrants, shall be punished by imprisonment in the workhouse, of the prison district in which they are convicted, for not less than six months, nor more than two years."

The commissioners mention the fact so plainly shown by the tables of "causes of imprisonment," which we have presented, that the majority of our convicts have been guilty of misdemeanors or violations of law and order rather than aggravated crimes. They mention the impropriety of confining such offenders in the same prisons with the worst criminals. The drunkards especially, they think, should be placed in workhouses rather than prisons. They conclude the argument, which they advance, to show the desirability and advantages of the proposed change, in the following words:—

"Indeed, it seems to us evident that to serve the triple purpose for which prisons are designed, viz., the protection of the community, punishment of crime and the reformation of the criminal, the system we recommend of district workhouses as complementary to the district houses of correction, presents the most simple, economical and effectual instrumentality.

"That the system, if established, would prove a saving of money, we think can be shown from the comparison of the net cost of supporting a prisoner in the larger with the same in the smaller prisons."

The "reformation" of the criminal above referred to, we suppose to mean the making a good citizen of him when his sentence has expired. This reformation we do not believe can ever be secured if a convict leaves a prison uneducated and unable to earn his living. A man who will not learn to read and write and earn his living outside of a prison, when he is committed to one, should stay there until he has made up his deficiencies.

Concerning the question of education in prisons, a law of the State provides that "the county commissioners of each county, and the aldermen of the city of Boston, with the sheriff of the county, may, at the expense of the county or city, furnish suitable instructions in reading and writing for one hour each evening, except Sundays, to such prisoners as may be benefited thereby and are desirous to receive the same."

The necessary changes in the above law would make it read that the proper officers *shall* furnish suitable instruction to those who are uneducated, and such studies *shall* be continued until the learners *are* benefited thereby. The State should be the judge of what forms a suitable education, and the criminal should receive one whether he was "desirous" or not.

The tables which we have presented are far from being as valuable as we could wish. A complete registry of the social statistics of each pauper and convict would supply material which could not fail to be of great service in dealing with paupers and convicts individually, and with pauperism and crime in the abstract. The statistics referred to hereinafter by the secretary of the board of state charities may be of the nature we suggest, but we have seen or heard of no *State* record of paupers. The secretary says:—

"The weekly and monthly returns of the county prisons are still received and filed by this office, but the valuable statistics which they embody are not available to the public, because the commissioners of prisons do not yet make any special use of them, and the clerical force allowed me by the Legislature is not such that they can be tabulated in this office. This seems to me a matter for the serious consideration of the Legislature during the coming session. The board of state charities now performs no duty whatever respecting the county prisons, and therefore has no occasion to require reports from them as to the admission and discharge of prisoners. Hence, I can reach no other conclusion than that the Legislature should provide the commissioners of prisons with the necessary facilities for compiling the statistics and giving them to the public."

We trust such statistics will be gathered and published as will show, especially, the number of illiterate paupers and convicts, and the number of those, in both classes, who are unprepared to earn a living by some recognized and profitable employment. The great secret of preventing the extension of pauperism and the increase of crime, lies in this twofold education. The book education can be easily provided for. The industrial education will be a greater and, at first, a more perplexing undertaking. But it would be better and cheaper to establish and maintain industrial schools in every prison than to establish more courts of justice for offenders, or build one more prison for their incarceration.

We do not believe that the workingmen of Massachusetts would see any danger to themselves or their prosperity if the able-bodied paupers and the convicts were fitted to earn an honest living. We think, rather, that they would rejoice in that elevating process which would make self-supporting citizens out of the unfortunate and criminal classes.

The real injury to laboring men exists in supporting thousands in idleness by the proceeds of taxation, and in paying them trivial wages which enable the contractors for prison labor to make undue profits, or undersell their competitors in trade.

This article was not designed to be the vehicle of particular recommendations to secure the results which so many consider to be desirable. But we consider that the statistics which we give indicate the positive value of a complete system of registry. Upon that registry should be based the efforts for the twofold education which we have explained.

All these steps should be taken under uniform and energetic State control. In such case, we should look, and we think with reason, in due time, for a decrease in preventable pauperism and ignorant crime,—to a less expense, or deficiency, for the maintenance of charitable and correctional institutions, and a consequent lightening of taxation. All this would conduce to the relief and protection of the community, the alleviation of the condition of the poor and helpless, the judicious punishment of the wicked, and the practical reformation of the vagrant and criminal.

PART VI.

MASSACHUSETTS MANUFACTORIES:

PERSONS EMPLOYED IN EACH STORY, AND THEIR MEANS OF ESCAPE IN CASE OF FIRE.

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In the census schedules used in gathering the particulars concerning the manufactures of this State, certain inquiries were embraced which related particularly to the manufactories themselves. The points concerning which information was required, were, first, the size of the establishments, meaning the length and width in feet and the number of stories, designating the basements and attics; second, the number of persons employed in each story; and third, the particular means of escape in case of fire or panic, with information relating to doors swinging inwardly, outwardly, sliding, etc.

These matters have previously received consideration in public documents. Part V. of the fifth annual report of this Bureau was devoted to the consideration of the "condition of textile fabric manufactories in Massachusetts," and contained the results of investigations made by competent and reliable parties, in person, as regarded 233 such establishments. These investigations comprehended the means of escape in case of fire, the protection of shafting, the guarding and cleaning of machinery, the running of elevators, ventilation and the average air-space for operatives.

In Part III. of the sixth report of the Bureau, a special report was made upon the disaster at Granite Mills in Fall River, and a presentation was given showing the means of escape in case of fire or panic from the *upper stories* of the 233 textile manufactories previously mentioned. The article closed with the outline of a "factory act" designed to secure the comfort and safety of working people in all kinds of manufactories.

The chief detective of the Commonwealth, in his report dated January, 1877, presented the results of the inspection, by three of his deputies, of 1,287 factories, considering the points already particularized, and, in addition, information in regard to steam boilers and accidents.

In taking the census, the owners or lessees of every establishment in the State, without regard to kind of business or number of persons employed, were called upon to answer the previously mentioned inquiries, and the returns were full and reliable. The figures in this article are presented here as being particularly statistics of labor.

We have selected for this article the returns of the 19 cities and 21 important manufacturing towns as far as they relate to the persons employed in each story and their means of escape in case of fire or panic.

The remaining towns are omitted for several reasons. Their establishments are usually small, rarely above two stories in height, and so situated as to render the escape of the few employés in case of danger almost a matter of certainty. The full presentation, also, would have occupied a hundred pages or more of this volume, and, in our opinion, the value of the statistics did not warrant their printing. The full returns are in the possession of the Bureau, however, and are available for any official purpose or legislative requirement.

A brief explanation of the tables may lead to an easier comprehension of the facts they contain. We will take the Fall River tables for illustration. In the first table we classify the persons employed under five divisions, which give the number of establishments employing 5 or less, 6 to 20, 21 to 100, 101 to 300, and above 300 persons. The number of persons employed in each story is given, with a designation of the number of stories of the various buildings. All the columns in this table contain the figures in duplicate, and, of course, the total given in either case is, and should be, only *half* the actual sum of the column. In the second table the means of escape are given in combination with a classification showing the story in which employed and the number working there. The letters "f. e." following a figure indicate that a "fire escape" is supplied in connection with the other means of escape specified at the head of the column in which the figures occur. These means of escape relate particularly to *floors* or *rooms*, and the classification of number does not of course compare with the similar classification in the first table, which latter refers to the number of persons in *each establishment*.

The tables can be used in conjunction, as follows: from the first table we learn that 4,349 persons work in the *second stories* of buildings in Fall River. For them are supplied (see means of escape from *second* story in second table) 89 stairways and 29 fire escapes, or an average to each of 37 persons. In the sixth story are employed 775 persons, having 20 stairways and 12 fire escapes, being an average to each of 24 persons.

The 19 cities are given in their county order; then follow the 21 towns in similar order; recapitulations of the important points in the tables complete the statistical presentation.

CITY OF FALL RIVER, BRISTOL COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 5 or less persons, . .	120	207	87	20	-	-	-	314
In one-story buildings, . .	99	205	-	-	-	-	-	205
In two-story buildings, . .	16	2	37	-	-	-	-	39
In three-story buildings, . .	5	-	-	20	-	-	-	20
Employing 6 to 20 persons, . .	62	341	240	80	-	12	-	673
In one-story buildings, . .	31	308	-	-	-	-	-	308
In two-story buildings, . .	22	17	227	-	-	-	-	244
In three-story buildings, . .	8	16	13	80	-	-	-	109
In five-story buildings, . .	1	-	-	-	-	12	-	12
Employing 21 to 100 persons, . .	21	421	395	32	79	-	-	927
In one-story buildings, . .	7	223	-	-	-	-	-	223
In two-story buildings, . .	10	183	271	-	-	-	-	454
In four-story buildings, . .	4	15	124	32	79	-	-	250
Employing 101 to 300 persons, .	16	994	770	513	403	346	113	3,139
In one-story buildings, . .	1	230	-	-	-	-	-	230
In two-story buildings, . .	1	90	20	-	-	-	-	110
In four-story buildings, . .	4	153	197	100	140	-	-	590
In five-story buildings, . .	5	330	289	255	155	236	-	1,265
In six-story buildings, . .	5	191	264	158	108	110	113	944
Employing over 300 persons, . .	22	2,744	2,907	2,102	1,619	1,557	662	11,591
In four-story buildings, . .	1	216	140	120	139	-	-	615
In five-story buildings, . .	12	1,261	1,317	972	851	889	-	5,290
In six-story buildings, . .	9	1,267	1,450	1,010	629	668	662	5,686
Totals, ...	241	4,707	4,349	2,747	2,101	1,915	775	16,594

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.
From second story—					
For 5 or less persons, . .	22	3 f. e.	-	1	1
For 6 to 20 persons, . . .	22	-	-	1	-
For 21 to 100 persons, . .	5 6 f. e.	-	-	-	8 f. e.
For 101 to 300 persons, . .	1 f. e.	2 f. e.	1 f. e.	-	7 f. e.
For over 300 persons, . .	-	1 f. e.	-	-	-
From third story—					
For 5 or less persons, . .	10	-	-	-	-
For 6 to 20 persons, . . .	3 2 f. e.	-	1 f. e.	-	-
. For 21 to 100 persons, . .	1 5 f. e.	11 f. e.	3	-	6 f. e.
For 101 to 300 persons, . .	1 f. e.	3 f. e.	-	-	3 f. e.
From fourth story—					
For 5 or less persons, . .	1 f. e.	-	-	-	1 f. e.
For 6 to 20 persons, . . .	1 5 f. e.	2 f. e.	-	-	1 f. e.
For 21 to 100 persons, . .	4 f. e.	10 f. e.	3 f. e.	-	8 f. e.
For 101 to 300 persons, . .	1 f. e.	1 f. e.	-	-	2 f. e.
From fifth story—					
For 6 to 20 persons, . . .	2 f. e.	2 f. e.	-	-	-
For 21 to 100 persons, . .	5 f. e.	9 f. e.	3 f. e.	-	8 f. e.
For 101 to 300 persons, . .	-	-	2 f. e.	-	2 f. e.
From sixth story—					
For 6 to 20 persons, . . .	1 f. e.	-	1 f. e.	-	-
For 21 to 100 persons, . .	1 f. e.	4 f. e.	1 f. e.	-	4 f. e.

CITY OF NEW BEDFORD, BRISTOL COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 5 or less persons,	135	299	93	3	-	-	395
In one-story buildings,	100	275	-	-	-	-	275
In two-story buildings,	33	23	90	-	-	-	113
In three-story buildings,	2	1	3	3	-	-	7
Employing 6 to 20 persons,	80	432	292	50	15	-	789
In one-story buildings,	33	293	-	-	-	-	293
In two-story buildings,	38	103	263	-	-	-	366
In three-story buildings,	8	36	29	50	-	-	115
In four-story buildings,	1	-	-	-	15	-	15
Employing 21 to 100 persons,	19	363	213	160	8	-	744
In one-story buildings,	3	130	-	-	-	-	130
In two-story buildings,	7	193	126	-	-	-	319
In three-story buildings,	7	30	73	140	-	-	243
In four-story buildings,	2	10	14	20	8	-	52
Employing 101 to 300 persons,	6	178	347	151	55	-	731
In three-story buildings,	4	163	252	94	-	-	509
In four-story buildings,	2	15	95	57	55	-	222
Employing over 300 persons,	2	495	344	552	445	147	1,983
In four-story buildings,	1	231	82	50	120	-	483
In five-story buildings,	1	264	262	502	325	147	1,500
Totals,	242	1,767	1,289	916	523	147	4,642

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Two inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—					
For 5 or less persons,	47 1 f. e.	-	1	-	1
For 6 to 20 persons,	39	1	1	-	-
For 21 to 100 persons,	4 2 f. e.	1 f. e.	-	1 f. e.	2
For 101 to 300 persons,	-	-	-	1 f. e.	-
From third story—					
For 5 or less persons,	3 1 f. e.	-	1	-	-
For 6 to 20 persons,	1 f. e. 10	-	-	-	1
For 21 to 100 persons,	7	1	-	1 f. e.	-
For over 300 persons,	-	-	-	1 f. e.	-
From fourth story—					
For 5 or less persons,	3	-	-	-	-
For 6 to 20 persons,	1	-	-	-	-
For 21 to 100 persons,	-	-	-	1 f. e.	-
For over 300 persons,	-	-	-	1 f. e.	-
From fifth story—					
For 101 to 300 persons,	-	-	-	1 f. e.	-

CITY OF TAUNTON, BRISTOL COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY. 1st.	2d.	3d.	4th.	5th.	Totals.
Employing 5 or less persons, . .	67	114	44	6	7	-	171
In one-story buildings, . .	47	112	-	-	-	-	112
In two-story buildings, . .	15	2	43	-	-	-	45
In three-story buildings, . .	8	-	1	6	-	-	7
In four-story buildings, . .	2	-	-	-	7	-	7
Employing 6 to 20 persons, . .	46	329	205	37	-	-	571
In one-story buildings, . .	22	228	-	-	-	-	228
In two-story buildings, . .	19	91	173	-	-	-	264
In three-story buildings, . .	5	10	32	37	-	-	79
Employing 21 to 100 persons, . .	13	461	220	53	6	-	740
In one-story buildings, . .	2	145	-	-	-	-	145
In two-story buildings, . .	9	272	184	-	-	-	456
In three-story buildings, . .	1	16	21	23	-	-	60
In four-story buildings, . .	1	28	15	30	6	-	79
Employing 101 to 300 persons, .	5	344	271	165	44	12	836
In two-story buildings, . .	1	130	100	-	-	-	230
In three-story buildings, . .	2	145	90	95	-	-	330
In four-story buildings, . .	1	47	35	40	28	-	150
In five-story buildings, . .	1	22	46	30	16	12	126
Employing over 300 persons, . .	3	390	423	327	110	-	1,250
In three-story buildings, . .	1	140	140	70	-	-	350
In four-story buildings, . .	2	250	283	257	110	-	900
Totals, ...	134	1,638	1,163	588	167	12	3,568

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE. One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.
From second story—					
For 5 or less persons, . .	19	-	-	1	-
For 6 to 20 persons, . . .	19	1	-	2	1 f. e.
For 21 to 100 persons, . .	6	2 1 f. e.	3	-	1 f. e.
For 101 to 300 persons, . .	2 f. e.	-	-	-	1 f. e.
From third story—					
For 5 or less persons, . .	4	-	-	-	-
For 6 to 20 persons, . . .	4	-	-	-	-
For 21 to 100 persons, . .	3 4 f. c.	2 1 f. e.	-	-	1 f. e.
From fourth story—					
For 5 or less persons, . .	2	-	-	-	-
For 6 to 20 persons, . . .	1 f. e.	-	-	-	-
For 21 to 100 persons, . .	1 f. e.	-	-	-	2 f. e.
From fifth story—					
For 5 or less persons, . .	1 f. e.	-	-	-	-

City of Gloucester, Essex County.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	Persons Employed in each Story. 1st.	2d.	3d.	Totals.
Employing 5 or less persons,	67	141	33	-	174
In one-story buildings,	55	132	-	-	132
In two-story buildings,	12	9	33	-	42
Employing 6 to 20 persons,	33	200	90	14	304
In one-story buildings,	17	143	-	-	143
In two-story buildings,	12	53	78	-	131
In three-story buildings,	4	4	12	14	30
Employing 21 to 100 persons,	5	119	66	8	193
In one-story buildings,	2	89	-	-	89
In two-story buildings,	2	22	54	-	76
In three-story buildings,	1	8	12	8	28
Totals,	105	460	189	22	671

Means of Escape in case of Fire.

CLASSIFICATION.	Means of Escape. One inside stairway.	Two inside stairways.	Three inside stairways.	Five inside stairways.	Outside stairway.
From second story—					
For 5 or less persons,	20	-	-	-	1
For 6 to 20 persons,	9	-	-	-	-
For 21 to 100 persons,	1	-	-	-	-
From third story—					
For 5 or less persons,	8	-	-	-	-
For 6 to 20 persons,	2	-	-	-	-

CITY OF HAVERHILL, ESSEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 5 or less persons, . .	190	304	144	30	4	1	483
In one-story buildings, . .	119	290	-	-	-	-	290
In two-story buildings, . .	54	11	137	-	-	-	148
In three-story buildings, . .	13	3	7	27	-	-	37
In four-story buildings, . .	3	-	-	3	4	-	7
In five-story buildings, . .	1	-	-	-	-	1	1
Employing 6 to 20 persons, . .	89	327	323	206	42	-	898
In one-story buildings, . .	27	226	-	-	-	-	226
In two-story buildings, . .	25	62	225	-	-	-	287
In three-story buildings, . .	29	28	76	172	-	-	276
In four-story buildings, . .	8	11	22	34	42	-	109
Employing 21 to 100 persons, . .	36	164	429	441	335	26	1,395
In one-story buildings, . .	1	30	-	-	-	-	30
In two-story buildings, . .	7	4	220	-	-	-	224
In three-story buildings, . .	12	61	86	253	-	-	400
In four-story buildings, . .	13	50	87	152	282	-	571
In five-story buildings, . .	3	19	36	36	53	26	170
Employing 101 to 300 persons, .	2	7	13	74	142	106	342
In four-story buildings, . .	1	4	7	64	92	-	167
In five-story buildings, . .	1	3	6	10	50	106	175
Totals, ...	317	802	909	751	523	133	3,118

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Two inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—					
For 5 or less persons, . .	81	8	-	-	2
For 6 to 20 persons, . . .	31	-	4	1 f. e.	1
For 21 to 100 persons, . .	9	-	-	-	-
From third story—					
For 5 or less persons, . .	31	-	1	-	2
For 6 to 20 persons, . . .	34	-	-	1 f. e.	-
For 21 to 100 persons, . .	8	-	-	-	-
From fourth story—					
For 5 or less persons, . .	8	-	-	-	-
For 6 to 20 persons, . . .	18	-	-	-	-
For 21 to 100 persons, . .	8	-	-	-	-
From fifth story—					
For 5 or less persons, . .	1	1	-	-	-
For 6 to 20 persons, . . .	2	-	-	-	-
For 101 to 300 persons, . .	1	-	-	-	-

CITY OF LAWRENCE, ESSEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY. 1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	Totals.
Employing 5 or less persons, .	137	229	56	16	5	-	-	-	-	306
In one-story buildings, .	88	183	-	-	-	-	-	-	-	183
In two-story buildings, .	30	31	46	-	-	-	-	-	-	77
In three-story buildings, .	10	8	5	10	-	-	-	-	-	23
In four-story buildings, .	9	7	5	6	5	-	-	-	-	23
Employing 6 to 20 persons, .	51	284	146	77	4	-	-	-	-	511
In one-story buildings, .	19	192	-	-	-	-	-	-	-	192
In two-story buildings, .	13	48	56	-	-	-	-	-	-	104
In three-story buildings, .	16	34	67	71	-	-	-	-	-	172
In four-story buildings, .	3	10	23	6	4	-	-	-	-	43
Employing 21 to 100 persons, .	18	432	331	110	15	-	-	-	-	888
In one-story buildings, .	4	119	-	-	-	-	-	-	-	119
In two-story buildings, .	7	166	143	-	-	-	-	-	-	309
In three-story buildings, .	5	98	129	85	-	-	-	-	-	312
In four-story buildings, .	2	49	59	25	15	-	-	-	-	148
Employing 101 to 300 persons,	2	134	98	85	38	-	-	-	-	355
In two-story buildings, .	1	49	60	-	-	-	-	-	-	109
In five-story buildings, .	1	85	38	85	38	-	-	-	-	246
Employing over 300 persons, .	6	2,572	2,746	2,052	1,288	458	468	336	92	10,012
In five-story buildings, .	2	592	340	211	189	80	-	-	-	1,421
In six-story buildings, .	1	182	88	92	100	40	131	-	-	633
In seven-story buildings, .	2	1,415	1,692	1,044	968	295	295	274	-	5,983
In eight-story buildings, .	1	383	626	705	31	34	42	62	92	1,975
Totals, ...	214	3,651	3,877	2,340	1,350	458	468	336	92	12,072

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE. One inside stairway.	Two inside stairways.	Three inside stairways.	Five inside stairways.	Outside stairway.	Tower stairways.
From second story—						
For 5 or less persons, . .	22	-	-	-	3	-
For 6 to 20 persons, . . .	14	1	-	-	1	-
For 21 to 100 persons, . .	11	-	-	-	-	8 f. e.
For 101 to 300 persons, . .	1 f. e.	-	-	-	-	5 f. e.
For over 300 persons, . .	1 f. e.	-	-	1 f. e.	-	-
From third story—						
For 5 or less persons, . .	8	1	-	-	-	-
For 6 to 20 persons, . . .	8	1	-	-	-	-
For 21 to 100 persons, . .	2	1 f. e.	1	-	-	2
For 101 to 300 persons, . .	2 f. e.	-	-	-	-	4 f. e.
For over 300 persons, . .	-	-	-	1 f. e.	-	1 f. e.
From fourth story—						
For 5 or less persons, . .	1	-	-	-	-	-
For 6 to 20 persons, . . .	1	-	-	-	-	-
For 21 to 100 persons, . .	-	1	-	-	-	1 f. e.
For 101 to 300 persons, . .	2 f. e.	-	-	-	-	5 f. e.
For over 300 persons, . .	-	-	-	1 f. e.	-	-
From fifth story—						
For 21 to 100 persons, . .	1 f. e.	-	-	-	-	3 f. e.
For 101 to 300 persons, . .	-	-	-	1 f. e.	-	1 f. e.
From sixth story—						
For 21 to 100 persons, . .	-	-	-	-	-	1 f. e.
For 101 to 300 persons, . .	1 f. e.	-	-	1 f. e.	-	1 f. e.
From seventh story—						
For 21 to 100 persons, . .	-	-	-	-	-	2 f. e.
For 101 to 300 persons, . .	-	-	-	1 f. e.	-	-
From eighth story—						
For 21 to 100 persons, . .	-	-	-	-	-	1 f. e.

City of Lynn, Essex County.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY. 1st.	2d.	3d.	4th.	5th.	6th.	Totals.
Employing 5 or less persons,	216	414	94	13	5	-	-	526
In one-story buildings,	165	391	-	-	-	-	-	391
In two-story buildings,	84	17	89	-	-	-	-	106
In three-story buildings,	15	4	4	13	-	-	-	21
In four-story buildings,	2	2	1	-	5	-	-	5
Employing 6 to 20 persons,	157	661	569	362	65	-	-	1,657
In one-story buildings,	45	401	-	-	-	-	-	401
In two-story buildings,	70	216	530	-	-	-	-	746
In three-story buildings,	35	34	84	341	-	-	-	459
In four-story buildings,	7	10	5	21	65	-	-	101
Employing 21 to 100 persons,	109	775	1,285	1,312	712	396	-	4,480
In one-story buildings,	4	127	-	-	-	-	-	127
In two-story buildings,	28	246	602	-	-	-	-	848
In three-story buildings,	35	231	409	882	-	-	-	1,522
In four-story buildings,	30	90	168	312	498	-	-	1,068
In five-story buildings,	12	81	106	118	214	396	-	915
Employing 101 to 300 persons,	20	366	628	995	881	633	139	3,642
In three-story buildings,	2	42	80	128	-	-	-	250
In four-story buildings,	6	177	344	377	430	-	-	1,328
In five-story buildings,	11	146	194	470	391	613	-	1,814
In six-story buildings,	1	1	10	20	60	20	139	250
Totals,	502	2,216	2,576	2,682	1,663	1,029	139	10,305

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE. One inside stairway.	Two inside stairways.	Outside stairway.	Inside and outside stairways.
From second story—				
For 5 or less persons,	84	2	-	-
For 6 to 20 persons,	84	10	3	4
For 21 to 100 persons,	31	5	-	-
From third story—				
For 5 or less persons,	24	4	1	-
For 6 to 20 persons,	52	12	5	-
For 21 to 100 persons,	31	4	3	1
For 101 to 300 persons,	-	1	-	-
From fourth story—				
For 5 or less persons,	5	-	-	-
For 6 to 20 persons,	10	2	1	-
For 21 to 100 persons,	29	5	-	-
For 101 to 300 persons,	1	1	-	-
From fifth story—				
For 6 to 20 persons,	2	-	-	-
For 21 to 100 persons,	14	3	1	-
For 101 to 300 persons,	1	-	-	-
From sixth story—				
For 101 to 300 persons,	1	-	-	-

CITY OF NEWBURYPORT, ESSEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 5 or less persons,	82	162	42	18	-	-	-	222
In one-story buildings,	60	161	-	-	-	-	-	161
In two-story buildings,	15	1	42	-	-	-	-	43
In three-story buildings,	7	-	-	18	-	-	-	18
Employing 6 to 20 persons,	42	288	119	62	-	-	-	469
In one-story buildings,	22	245	-	-	-	-	-	245
In two-story buildings,	13	40	105	-	-	-	-	145
In three-story buildings,	7	3	14	62	-	-	-	79
Employing 21 to 100 persons,	9	220	106	175	-	-	-	501
In one-story buildings,	3	178	-	-	-	-	-	178
In two-story buildings,	1	35	40	-	-	-	-	75
In three-story buildings,	5	7	66	175	-	-	-	248
Employing 101 to 300 persons,	6	280	364	325	187	49	-	1,205
In two-story buildings,	1	130	20	-	-	-	-	150
In three-story buildings,	1	25	65	19	-	-	-	109
In four-story buildings,	2	53	80	180	112	-	-	425
In five-story buildings,	2	72	199	126	75	49	-	521
Employing over 300 persons,	1	78	110	60	35	33	34	350
In six-story buildings,	1	78	110	60	35	33	34	350
Totals,	140	1,028	741	640	222	82	34	2,747

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Five inside stairways.	Tower stairways.	Inside and outside stairways.
From second story—						
For 5 or less persons,	19	-	-	-	-	-
For 6 to 20 persons,	16	1	-	-	-	-
For 21 to 100 persons,	1	1 f. e.	-	-	2 f. e.	1
For 101 to 300 persons,	-	-	-	-	2 f. e.	-
From third story—						
For 5 or less persons,	9	-	-	-	-	-
For 6 to 20 persons,	7	-	-	-	-	-
For 21 to 100 persons,	3	-	-	-	2 f. e.	1
For 101 to 300 persons,	-	-	-	-	2 f. e.	-
From fourth story—						
For 6 to 20 persons,	-	-	-	-	1 f. e.	-
For 21 to 100 persons,	1	-	-	-	3 f. e.	-
From fifth story—						
For 6 to 20 persons,	-	-	-	-	1 f. e.	-
For 21 to 100 persons,	-	-	-	-	2 f. e.	-
From sixth story—						
For 21 to 100 persons,	-	-	-	-	1 f. e.	-

City of Salem, Essex County.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	Persons Employed in each Story.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 5 or less persons,	294	532	188	-	29	-	-	749
In one-story buildings,	210	518	-	-	-	-	-	518
In two-story buildings,	72	14	183	-	-	-	-	197
In three-story buildings,	12	-	5	-	29	-	-	34
Employing 6 to 20 persons,	120	764	352	164	-	-	-	1,280
In one-story buildings,	54	531	-	-	-	-	-	531
In two-story buildings,	38	136	243	-	-	-	-	379
In three-story buildings,	28	97	109	164	-	-	-	370
Employing 21 to 100 persons,	27	359	296	268	23	3	-	949
In one-story buildings,	5	139	-	-	-	-	-	139
In two-story buildings,	7	50	113	-	-	-	-	163
In three-story buildings,	10	132	122	224	-	-	-	478
In four-story buildings,	4	20	30	28	20	-	-	98
In five-story buildings,	1	18	31	16	3	3	-	71
Employing 101 to 300 persons,	4	276	94	70	22	20	18	500
In two-story buildings,	2	196	24	-	-	-	-	220
In three-story buildings,	1	50	50	30	-	-	-	130
In six-story buildings,	1	30	20	40	22	20	18	150
Employing over 300 persons,	1	493	321	236	138	147	-	1,335
In five-story buildings,	1	493	321	236	138	147	-	1,335
Totals,	446	2,424	1,251	738	212	170	18	4,813

Means of Escape in case of Fire.

CLASSIFICATION.	Means of Escape.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—						
For 5 or less persons,	91 1 f. e.	1	-	2	-	1
For 6 to 20 persons,	43 2 f. e.	8	-	1	-	-
For 21 to 100 persons,	3	-	-	-	1	-
For 101 to 300 persons,	-	-	-	-	1 f. e.	-
From third story—						
For 5 or less persons,	28	1	-	1	-	-
For 6 to 20 persons,	19	3	-	1	-	-
For 21 to 100 persons,	1 f. e.	2	-	1	-	-
For 101 to 300 persons,	-	-	-	-	1 f. e.	-
From fourth story—						
For 5 or less persons,	2	-	-	-	-	-
For 6 to 20 persons,	2 1 f. e.	2	-	-	-	-
For 101 to 300 persons,	-	-	-	-	1 f. e.	-
From fifth story—						
For 5 or less persons,	1	-	-	-	-	-
For 6 to 20 persons,	1	-	-	-	-	-
For 101 to 300 persons,	-	-	-	-	1 f. e.	-
From sixth story—						
For 6 to 20 persons,	1 f. e.	-	-	-	-	-

CITY OF HOLYOKE, HAMPDEN COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 6 to 20 persons, . .	1	10	6	-	-	-	-	16
In two-story buildings, . .	1	10	6	-	-	-	-	16
Employing 21 to 100 persons, . .	9	229	273	60	18	3	-	583
In two-story buildings, . .	3	75	98	-	-	-	-	173
In three-story buildings, . .	4	98	115	53	-	-	-	266
In four-story buildings, . .	1	28	15	1	1	-	-	45
In five-story buildings, . .	1	28	45	6	17	3	-	99
Employing 101 to 300 persons, .	13	457	618	797	427	64	-	2,363
In three-story buildings, . .	3	80	100	175	-	-	-	355
In four-story buildings, . .	5	130	264	337	243	-	-	974
In five-story buildings, . .	5	247	254	285	184	64	-	1,034
Employing over 300 persons, . .	4	693	684	493	420	252	113	2,655
In three-story buildings, . .	1	178	290	140	-	-	-	608
In four-story buildings, . . .	1	149	54	111	19	-	-	333
In five-story buildings, . .	1	98	91	8	122	113	-	432
In six-story buildings, . .	1	268	249	234	279	139	113	1,282
Totals, ...	27	1,389	1,581	1,350	865	319	113	5,617

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.
From second story—					
For 6 to 20 persons, . . .	1 2 f. e.	-	-	-	-
For 21 to 100 persons, . .	2 12 f. e.	-	-	1 f. e.	2 4 f. e.
For 101 to 300 persons, . .	2 f. e.	-	-	-	-
From third story—					
For 5 or less persons, . .	2 f. e.	-	-	-	-
For 6 to 20 persons, . . .	2 f. e.	-	-	-	1
For 21 to 100 persons, . .	1 3 f. e.	-	-	1 f. e.	4 f. e.
For 101 to 300 persons, . .	2 f. e.	-	-	-	1
From fourth story—					
For 5 or less persons, . .	3 f. e.	-	-	-	-
For 6 to 20 persons, . . .	1 f. e.	1	-	-	1
For 21 to 100 persons, . .	4 f. e.	-	-	-	3 f. e.
For 101 to 300 persons, . .	1 f. e.	-	-	-	1 f. e.
From fifth story—					
For 5 or less persons, . .	2 f. e.	1	-	-	-
For 6 to 20 persons, . . .	-	-	-	-	2 f. e. 1
For 21 to 100 persons, . .	-	-	-	-	1 f. e.
For 101 to 300 persons, . .	1 f. e.	-	-	-	-
From sixth story—					
For 101 to 300 persons, . .	1 f. e.	-	-	-	-

CITY OF SPRINGFIELD, HAMPDEN COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 5 or less persons,	243	452	104	52	10	-	-	618
In one-story buildings,	184	441	-	-	-	-	-	441
In two-story buildings,	36	11	101	-	-	-	-	112
In three-story buildings,	19	-	3	52	-	-	-	55
In four-story buildings,	4	-	-	-	10	-	-	10
Employing 6 to 20 persons,	132	781	407	135	47	8	-	1,378
In one-story buildings,	65	657	-	-	-	-	-	657
In two-story buildings,	45	108	368	-	-	-	-	476
In three-story buildings,	17	16	39	120	-	-	-	175
In four-story buildings,	4	-	-	15	47	-	-	62
In five-story buildings,	1	-	-	-	-	8	-	8
Employing 21 to 100 persons,	54	1,220	380	364	257	5	2	2,228
In one-story buildings,	21	917	-	-	-	-	-	917
In two-story buildings,	9	125	171	-	-	-	-	296
In three-story buildings,	13	95	150	220	-	-	-	465
In four-story buildings,	9	59	51	133	247	-	-	490
In five-story buildings,	1	2	5	8	10	5	-	30
In six-story buildings,	1	22	3	8	-	-	2	30
Employing 101 to 300 persons,	6	167	180	246	70	140	111	914
In three-story buildings,	2	97	72	88	-	-	-	257
In four-story buildings,	1	33	40	24	13	-	-	110
In five-story buildings,	1	31	19	93	30	35	-	208
In six-story buildings,	2	6	49	41	27	105	111	339
Employing over 300 persons,	3	686	210	325	220	48	40	1,529
In one-story buildings,	1	341	-	-	-	-	-	341
In four-story buildings,	1	125	80	175	120	-	-	500
In six-story buildings,	1	220	130	150	100	48	40	688
Totals,	438	3,306	1,281	1,122	604	201	153	6,667

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—						
For 5 or less persons,	53	2 1 f. e.	-	4	-	-
For 6 to 20 persons,	51 1 f. e.	1	-	2	-	-
For 21 to 100 persons,	5	1	1	-	1 f. e.	-
For 101 to 300 persons,	1 f. e.	-	-	-	-	-
From third story—						
For 5 or less persons,	28 1 f. e.	-	-	1	-	-
For 6 to 20 persons,	23	-	-	-	-	3
For 21 to 100 persons,	7	2 1 f. e.	-	-	-	-
For 101 to 300 persons,	1 f. e.	-	-	-	1 f. e.	-
From fourth story—						
For 5 or less persons,	5 1 f. e.	-	-	-	-	1
For 6 to 20 persons,	8	1	-	-	-	-
For 21 to 100 persons,	4 3 f. e.	-	-	-	-	-
For 101 to 300 persons,	-	-	-	-	1 f. e.	-
From fifth story—						
For 5 or less persons,	1	-	-	-	-	-
For 6 to 20 persons,	1	1	-	-	-	-
For 21 to 100 persons,	1 f. e. 2	-	-	-	-	-
From sixth story—						
For 5 or less persons,	1	-	-	-	-	-
[illegible] to 100 persons,	1 1 f. e.	1	-	-	-	-

CITY OF CAMBRIDGE, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 5 or less persons,	197	364	86	21	3	-	-	474
In one-story buildings,	158	358	-	-	-	-	-	358
In two-story buildings,	33	6	86	-	-	-	-	92
In three-story buildings,	5	-	-	20	-	-	-	20
In four-story buildings,	1	-	-	1	3	-	-	4
Employing 6 to 20 persons,	88	621	255	43	30	-	-	949
In one-story buildings,	47	498	-	-	-	-	-	498
In two-story buildings,	28	92	215	-	-	-	-	307
In three-story buildings,	10	19	30	41	-	-	-	90
In four-story buildings,	3	12	10	2	30	-	-	54
Employing 21 to 100 persons,	44	975	487	265	152	36	-	1,915
In one-story buildings,	14	497	-	-	-	-	-	497
In two-story buildings,	11	234	205	-	-	-	-	439
In three-story buildings,	8	124	119	138	-	-	-	381
In four-story buildings,	5	84	82	68	64	-	-	298
In five-story buildings,	6	36	81	59	88	36	-	300
Employing 101 to 300 persons,	13	1,406	482	400	250	20	10	2,568
In one-story buildings,	5	1,026	-	-	-	-	-	1,026
In two-story buildings,	1	45	72	-	-	-	-	117
In three-story buildings,	2	225	185	145	-	-	-	555
In four-story buildings,	4	90	180	245	230	-	-	745
In six-story buildings,	1	20	45	10	20	20	10	115
Employing over 300 persons,	2	279	179	67	135	43	-	703
In four-story buildings,	1	200	100	-	75	-	-	375
In five-story buildings,	1	79	79	67	60	43	-	328
Totals,	344	3,645	1,489	796	570	99	10	6,609

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—						
For 5 or less persons,	48	-	-	4	-	-
For 6 to 20 persons,	32 2 f. e.	-	-	-	1 f. e.	8
For 21 to 100 persons,	12 3 f. e.	-	-	-	-	1
From third story—						
For 5 or less persons,	17	-	1	-	-	-
For 6 to 20 persons,	13 1 f. e.	-	-	-	-	1
For 21 to 100 persons,	6 2 f. e.	1 f. e.	-	-	1 f. e.	1
From fourth story—						
For 5 or less persons,	4	-	-	-	-	-
For 6 to 20 persons,	8 1 f. e.	1	-	-	-	1
For 21 to 100 persons,	5 3 f. e.	-	-	-	-	-
From fifth story—						
For 5 or less persons,	8	-	-	-	-	-
For 21 to 100 persons,	1 f. e.	-	-	-	-	-
From sixth story—						
For 6 to 20 persons,	1 f. e.	-	-	-	-	-

CITY OF LOWELL, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.							Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	7th.	
Employing 5 or less persons, .	198	361	97	45	-	-	-	-	503
In one-story buildings, .	151	358	-	-	-	-	-	-	358
In two-story buildings, .	35	3	96	-	-	-	-	-	99
In three-story buildings, .	12	-	1	45	-	-	-	-	46
Employing 6 to 20 persons, .	103	595	326	146	44	-	-	-	1,111
In one-story buildings, .	41	431	-	-	-	-	-	-	431
In two-story buildings, .	37	131	264	-	-	-	-	-	395
In three-story buildings, .	20	19	56	141	-	-	-	-	216
In four-story buildings, .	5	14	6	5	44	-	-	-	69
Employing 21 to 100 persons, .	54	1,078	525	515	75	-	-	-	2,193
In one-story buildings, .	13	581	-	-	-	-	-	-	581
In two-story buildings, .	13	265	146	-	-	-	-	-	411
In three-story buildings, .	21	171	304	387	-	-	-	-	862
In four-story buildings, .	7	61	75	128	75	-	-	-	339
Employing 101 to 300 persons,	9	772	428	312	89	46	-	-	1,647
In one-story buildings, .	1	283	-	-	-	-	-	-	283
In two-story buildings, .	1	78	96	-	-	-	-	-	174
In three-story buildings, .	2	87	71	140	-	-	-	-	298
In four-story buildings, .	2	54	79	67	47	-	-	-	247
In five-story buildings, .	3	270	182	105	42	46	-	-	645
Employing over 300 persons, .	9	2,753	2,709	2,198	1,246	1,217	503	100	10,726
In five-story buildings, .	2	466	475	607	294	274	-	-	2,116
In six-story buildings, .	6	2,157	2,099	1,404	874	861	400	-	7,795
In seven-story buildings, .	1	130	135	187	78	82	103	100	815
Totals, . . .	373	5,559	4,085	3,216	1,454	1,263	503	100	16,180

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Five inside stairways.	Outside stairway.	Tower stairways.
From second story—						
For 5 or less persons, . .	47 1 f. e.	-	-	-	11	1
For 6 to 20 persons, . . .	46	-	3	-	4	2 1 f. e.
For 21 to 100 persons, . .	3 4 f. e.	2	3	-	-	4 f. e. 1
For 101 to 300 persons, . .	1	-	-	-	-	3 f. e.
For over 300 persons, . .	1 f. e.	-	-	1 f. e.	-	3 f. e.
From third story—						
For 5 or less persons, . .	20	1	-	-	3	-
For 6 to 20 persons, . . .	20	1	-	-	3	1
For 21 to 100 persons, . .	10 3 f. e.	1	-	-	-	5 f. e. 1
For 101 to 300 persons, . .	1	-	-	-	-	4 f. e.
For over 300 persons, . .	1 f. e.	-	-	-	-	2 f. e.
From fourth story—						
For 5 or less persons, . .	4	-	-	-	-	-
For 6 to 20 persons, . . .	7 2 f. e.	-	-	-	-	1 f. e.
For 21 to 100 persons, . .	1	-	-	-	-	1 5 f. e.
For 101 to 300 persons, . .	1 f. e.	-	-	-	-	3 f. e.
For over 300 persons, . .	-	-	-	-	-	1 f. e.
From fifth story—						
For 6 to 20 persons, . . .	1 f. e.	-	-	-	-	-
For 21 to 100 persons, . .	-	-	-	-	-	6 f. e.
For 101 to 300 persons, . .	1 f. e.	-	-	-	-	3 f. e.

Lowell—Means of Escape in case of Fire—Continued.

CLASSIFICATION.	MEANS OF ESCAPE.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Five inside stairways.	Outside stairway.	Tower stairways.
From sixth story—						
For 6 to 20 persons,	1	-	-	-	-	-
For 21 to 100 persons,	-	-	-	-	-	4 f. e.
For 101 to 300 persons,	-	-	-	-	-	2 f. e.
From seventh story—						
For 21 to 100 persons,	-	-	-	-	-	2 f. e.

CITY OF NEWTON, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.				Totals.
		1st.	2d.	3d.	4th.	
Employing 5 or less persons,	44	124	6	-	-	130
In one-story buildings,	42	122	-	-	-	122
In two-story buildings,	2	2	6	-	-	8
Employing 6 to 20 persons,	36	349	14	14	-	377
In one-story buildings,	32	323	-	-	-	323
In two-story buildings,	3	26	14	-	-	40
In three-story buildings,	1	-	-	14	-	14
Employing 21 to 100 persons,	10	215	98	15	20	348
In one-story buildings,	3	85	-	-	-	85
In two-story buildings,	4	99	48	-	-	147
In three-story buildings,	1	23	36	1	-	60
In four-story buildings,	2	8	14	14	20	56
Employing 101 to 300 persons,	3	200	132	58	58	448
In two-story buildings,	1	100	75	-	-	175
In four-story buildings,	2	100	57	58	58	273
Totals,	93	888	250	87	78	1,308

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Two inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—					
For 5 or less persons,	4	-	1	1 f. e.	-
For 6 to 20 persons,	5	-	-	-	-
For 21 to 100 persons,	1 2 f. e.	1	-	-	-
From third story—					
For 5 or less persons,	-	-	-	-	1
For 6 to 20 persons,	1	-	-	1	-
For 21 to 100 persons,	1 1 f. e.	-	-	-	-
From fourth story—					
For 5 or less persons,	1	-	-	-	-
For 6 to 20 persons,	1 f. e.	-	-	1 f. e.	-
For 21 to 100 persons,	1	-	-	-	-

CITY OF SOMERVILLE, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY. 1st.	2d.	3d.	4th.	5th.	Totals.
Employing 5 or less persons,	73	151	29	4	-	-	184
In one-story buildings,	61	142	-	-	-	-	142
In two-story buildings,	11	9	29	-	-	-	38
In three-story buildings,	1	-	-	4	-	-	4
Employing 6 to 20 persons,	26	224	58	5	-	-	287
In one-story buildings,	16	187	-	-	-	-	187
In two-story buildings,	9	32	53	-	-	-	85
In three-story buildings,	1	5	5	5	-	-	15
Employing 21 to 100 persons,	13	501	83	35	-	-	619
In one-story buildings,	9	404	-	-	-	-	404
In two-story buildings,	1	60	10	-	-	-	70
In three-story buildings,	3	37	73	35	-	-	145
Employing 101 to 300 persons,	2	164	58	60	40	19	341
In three-story buildings,	1	124	18	20	-	-	162
In five-story buildings,	1	40	40	40	40	19	179
Employing over 300 persons,	1	350	-	-	-	-	350
In one-story buildings,	1	350	-	-	-	-	350
Totals,	115	1,390	228	104	40	19	1,781

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE. One inside stairway.	Two inside stairways.	Three inside stairways.	Five inside stairways.	Outside stairway.
From second story—					
For 5 or less persons,	14	-	-	-	1
For 6 to 20 persons,	8	1	-	-	-
For 21 to 100 persons,	2 1 f. e.	-	-	-	-
From third story—					
For 5 or less persons,	3	-	-	-	-
For 6 to 20 persons,	1 1 f. e.	1	-	-	-
From fourth story—					
For 21 to 100 persons,	1 f. e.	-	-	-	-
From fifth story—					
For 101 to 300 persons,	1	-	-	-	-

City of Boston, Suffolk County.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	Totals.
Employing 5 or less persons, ...	2,907	4,368	1,175	918	404	65	13	-	-	-	6,948
In one-story b'ld'gs, .	1,930	4,289	-	-	-	-	-	-	-	-	4,289
In two-story b'ld'gs, .	475	69	1,138	-	-	-	-	-	-	-	1,207
In three-story b'ld'gs,	840	4	32	899	-	-	-	-	-	-	935
In four-story b'ld'gs,	133	6	5	16	393	-	-	-	-	-	420
In five-story b'ld'gs, .	25	-	-	1	11	64	-	-	-	-	76
In six-story b'ld'gs, .	4	-	-	2	-	1	13	-	-	-	16
Employing 6 to 20 persons, ...	1,173	5,155	2,812	2,706	1,429	542	72	3	-	-	12,719
In one-story b'ld'gs, .	427	4,231	-	-	-	-	-	-	-	-	4,231
In two-story b'ld'gs, .	273	565	2,280	-	-	-	-		-	-	2,845
In three-story b'ld'gs,	243	184	351	2,305	-	-	-	-	-	-	2,840
In four-story b'ld'gs,	151	117	145	280	1,267	-	-	-	-	-	1,809
In five-story b'ld'gs, .	66	88	27	103	144	517	-	-	-	-	829
In six-story b'ld'gs, .	12	20	9	18	16	23	70	-	-	-	156
In seven-story b'ld'gs,	1	-	-	-	2	2	2	3	-	-	9
Employing 21 to 100 persons, ...	379	5,070	3,311	3,769	2,498	1,198	599	-	-	-	16,445
In one-story b'ld'gs, .	55	2,237	-	-	-	-	-	-	-	-	2,237
In two-story b'ld'gs, .	56	1,048	1,289	-	-	-	-	-	-	-	2,337
In three-story b'ld'gs,	109	1,112	954	2,480	-	-	-	-	-	-	4,546
In four-story b'ld'gs,	87	345	636	870	2,000	-	-	-	-	-	3,851
In five-story b'ld'gs, .	51	263	340	389	440	896	-	-	-	-	2,328
In six-story b'ld'gs, .	21	65	92	30	58	302	599	-	-	-	1,146
Employing 101 to 300 persons, ...	52	2,335	1,576	1,548	1,652	1,011	266	10	20	19	8,437
In one-story b'ld'gs, .	1	140	-	-	-	-	-	-	-	-	140
In two-story b'ld'gs, .	9	880	561	-	-	-	-	-	-	-	1,441
In three-story b'ld'gs,	6	432	195	193	-	-	-	-	-	-	820
In four-story b'ld'gs, .	13	317	381	688	778	-	-	-	-	-	2,164
In five-story b'ld'gs, .	14	338	248	473	474	770	-	-	-	-	2,303
In six-story b'ld'gs, .	8	179	181	184	390	237	256	-	-	-	1,427
In nine-story b'ld'gs,	1	49	10	10	10	4	10	10	20	19	142
Employing over 300 persons, ...	5	1,040	48	8	463	540	134	-	-	-	2,233
In one-story b'ld'gs, .	1	600	-	-	-	-	-	-	-	-	600
In two-story b'ld'gs, .	1	440	10	-	-	-	-	-	-	-	450
In five-story b'ld'gs, .	1	-	-	-	200	200	-	-	-	-	400
In six-story b'ld'gs, .	2	-	38	8	263	340	134	-	-	-	783
Totals, . .	4,516	17,968	8,922	8,949	6,446	3,356	1,084	13	20	19	46,777

Means of Escape in case of Fire.

CLASSIFICATION.	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—						
For 5 or less persons, . .	613 8 f. e.	35 1 f. e.	-	29 1 f. e.	-	2
For 6 to 20 persons, . . .	834 11 f. e.	21	4	11	1 f. e.	5
For 21 to 100 persons, . .	51 12 f. e.	12	1	3	1	1
From third story—						
For 5 or less persons, . .	440 8 f. e.	20	-	2	-	-

Boston—Means of Escape in case of Fire.—Continued.

CLASSIFICATION.	MEANS OF ESCAPE.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From third story—Continued.						
For 6 to 20 persons, . . .	183 14 f. e.	18	2	4	-	-
For 21 to 100 persons, . .	65 11 f. e.	9	1	-	1 1 f. e.	-
For 101 to 300 persons, . .	2	-	-	-	-	-
From fourth story—						
For 5 or less persons, . .	200 2 f. e.	14	-	-	-	-
For 6 to 20 persons, . . .	148 13 f. e.	19	-	-	1 f. e.	-
For 21 to 100 persons, . .	55 7	6 2 f. e.	-	-	1	-
For 101 to 300 persons, . .	-	3	-	-	-	-
From fifth story—						
For 5 or less persons, . .	55 3 f. e.	2	-	-	-	-
For 6 to 20 persons, . . .	42 7 f. e.	14 1 f. e.	-	-	1	-
For 21 to 100 persons, . .	29 1 f. e.	3 1 f. e.	-	-	1 f. e.	-
For 101 to 300 persons, . .	3	1	-	-	-	-
From sixth story—						
For 5 or less persons, . .	9 2 f. e.	2	-	-	-	-
For 6 to 20 persons, . . .	11 2 f. e.	-	-	-	-	-
For 21 to 100 persons, . .	12 2 f. e.	1	1	-	1 f. e.	-
For 101 to 300 persons, . .	-	1	-	-	-	-
From seventh story—						
For 5 or less persons, . .	-	1	-	-	-	-
For 6 to 20 persons, . . .	1	-	-	-	-	-
From eighth story—						
For 6 to 20 persons, . . .	1	-	-	-	-	-
From ninth story—						
For 6 to 20 persons, . . .	1	-	-	-	-	-

CITY OF CHELSEA, SUFFOLK COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.				Totals.
		1st.	2d.	3d.	4th.	
Employing 5 or less persons, . .	76	166	43	3	-	212
In one-story buildings, . .	62	162	-	-	-	162
In two-story buildings, . .	13	4	43	-	-	47
In three-story buildings, . .	1	-	-	3	-	3
Employing 6 to 20 persons, . .	49	323	60	18	-	401
In one-story buildings, . .	25	220	-	-	-	220
In two-story buildings, . .	20	99	51	-	-	150
In three-story buildings, . .	4	4	9	18	-	31
Employing 21 to 100 persons, . .	13	364	86	81	1	532
In one-story buildings, . .	4	169	-	-	-	169
In two-story buildings, . .	4	151	40	-	-	191
In three-story buildings, . .	4	43	44	50	-	137
In four-story buildings, . .	1	1	2	31	1	35
Employing 101 to 300 persons, .	3	256	153	115	48	572
In two-story buildings, . .	1	46	63	-	-	109
In four-story buildings, . .	2	210	90	115	48	463
Totals, ...	141	1,109	342	217	49	1,717

Chelsea—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.					
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—						
For 5 or less persons,	23	3	-	1	-	-
For 6 to 20 persons,	16	-	-	1	-	1
For 21 to 100 persons,	1	-	-	-	1 f. e.	1
From third story—						
For 5 or less persons,	3	-	1	-	-	-
For 6 to 20 persons,	5	-	-	-	-	-
For 21 to 100 persons,	-	1	-	-	1 f. e.	1
From fourth story—						
For 5 or less persons,	-	1	-	-	-	-
For 21 to 100 persons,	-	-	-	-	1 f. e.	1

CITY OF FITCHBURG, WORCESTER COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.				Totals.
		1st.	2d.	3d.	4th.	
Employing 5 or less persons,	95	189	47	10	-	246
In one-story buildings,	76	182	-	-	-	182
In two-story buildings,	15	7	47	-	-	54
In three-story buildings,	4	-	-	10	-	10
Employing 6 to 20 persons,	33	233	82	21	-	336
In one-story buildings,	20	194	-	-	-	194
In two-story buildings,	8	32	64	-	-	96
In three-story buildings,	5	7	18	21	-	46
Employing 21 to 100 persons,	26	516	366	264	42	1,188
In one-story buildings,	3	165	-	-	-	165
In two-story buildings,	5	109	26	-	-	135
In three-story buildings,	15	175	284	213	-	672
In four-story buildings,	3	67	56	51	42	216
Employing 101 to 300 persons,	4	533	212	30	-	775
In two-story buildings,	3	453	172	-	-	625
In three-story buildings,	1	80	40	30	-	150
Totals,	158	1,471	707	325	42	2,545

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.			
	One inside stairway.	Two inside stairways.	Outside stairway.	Inside and outside stairways.
From second story—				
For 5 or less persons,	19 1 f. e.	-	2	1
For 6 to 20 persons,	15 1 f. e.	4	-	-
For 21 to 100 persons,	7 1 f. e.	2	-	-

Fitchburg—Means of Escape in case of Fire—Continued.

CLASSIFICATION.	MEANS OF ESCAPE.			
	One inside stairway.	Two inside stairways.	Outside stairway.	Inside and outside stairways.
From third story—				
For 5 or less persons,	14	2	-	-
For 6 to 20 persons,	6 1 f. e.	-	-	-
For 21 to 100 persons,	3 2 f. e.	2	-	-
From fourth story—				
For 6 to 20 persons,	1 1 f. e.	-	-	-
For 21 to 100 persons,	1 1 f. e.	-	-	-

CITY OF WORCESTER, WORCESTER COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 5 or less persons,	313	411	203	149	42	5	-	810
In one-story buildings,	178	391	-	-	-	-	-	391
In two-story buildings,	66	8	167	-	-	-	-	175
In three-story buildings,	53	12	36	148	-	-	-	196
In four-story buildings,	15	-	-	1	42	-	-	43
In five-story buildings,	1	-	-	-	-	5	-	5
Employing 6 to 20 persons,	118	604	322	244	135	11	-	1,316
In one-story buildings,	37	396	-	-	-	-	-	396
In two-story buildings,	32	129	228	-	-	-	-	357
In three-story buildings,	34	51	79	240	-	-	-	370
In four-story buildings,	11	6	15	4	114	-	-	139
In five-story buildings,	4	23	-	-	21	11	-	54
Employing 21 to 100 persons,	81	1,397	964	938	381	90	-	3,770
In one-story buildings,	8	252	-	-	-	-	-	252
In two-story buildings,	12	211	169	-	-	-	-	380
In three-story buildings,	26	560	366	435	-	-	-	1,361
In four-story buildings,	25	329	355	355	323	-	-	1,362
In five-story buildings,	10	45	74	148	68	90	-	413
Employing 101 to 300 persons,	15	809	373	625	447	260	-	2,514
In one-story buildings,	1	280	-	..	-	-	-	280
In three-story buildings,	1	180	69	38	-	-	-	287
In four-story buildings,	5	202	94	224	233	-	-	753
In five-story buildings,	7	180	210	363	214	127	-	1,094
In six-story buildings,	1	17	-	-	-	133	-	150
Employing over 300 persons,	1	296	170	89	41	86	-	682
In five-story buildings,	1	296	170	89	41	86	-	682
Totals,	528	3,517	2,032	2,045	1,046	452	-	9,092

Worcester—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Two inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—					
For 5 or less persons,	72	3	10	-	1
For 6 to 20 persons,	41	11	3	2 f. e.	6
For 21 to 100 persons,	18 4 f. e.	2	1	2 f. e.	1
For 101 to 300 persons,	1	-	-	-	1
From third story—					
For 5 or less persons,	67	8	-	1 f. e.	-
For 6 to 20 persons,	38 2 f. e.	9	-	3	1
For 21 to 100 persons,	19 2 f. e.	5	1	3 f. e.	-
For 101 to 300 persons,	1 f. e.	-	-	-	-
From fourth story—					
For 5 or less persons,	22	2	-	1	1
For 6 to 20 persons,	21 1 f. e.	1	-	2 f. e.	-
For 21 to 100 persons,	10 1 f. e.	2	-	2 f. e.	-
From fifth story—					
For 5 or less persons,	3	1	-	-	1
For 6 to 20 persons,	3	-	-	-	-
For 21 to 100 persons,	4 2 f. e.	1	-	-	-
For 101 to 300 persons,	-	2	-	-	-

In the city presentations, which we have just concluded, every establishment for which returns were made is accounted for. In the town presentations which follow, in many cases, we have only taken into consideration the principal establishments, rejecting those in which less than five persons were employed in one-story buildings, and in similar unimportant instances. The construction, nature of facts contained, and use of the tables, are precisely the same as in the city showings.

Town of Adams, Berkshire County.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	Persons Employed in each Story.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 5 or less persons,	63	145	17	6	-	-	168
In one-story buildings,	53	134	-	-	-	-	134
In two-story buildings,	8	11	17	-	-	-	28
In three-story buildings,	2	-	-	6	-	-	6
Employing 6 to 20 persons,	29	159	113	22	-	-	294
In one-story buildings,	7	70	-	-	-	-	70
In two-story buildings,	17	83	96	-	-	-	179
In three-story buildings,	5	6	17	22	-	-	45
Employing 21 to 100 persons,	13	223	344	162	28	-	757
In two-story buildings,	8	76	32	-	-	-	108
In three-story buildings,	3	135	260	147	-	-	542
In four-story buildings,	2	12	52	15	28	-	107
Employing 101 to 300 persons,	12	655	850	360	132	3	2,000
In three-story buildings,	5	319	402	156	-	-	877
In four-story buildings,	6	299	367	173	114	-	953
In five-story buildings,	1	37	81	31	18	3	170
Employing over 300 persons,	2	255	330	250	210	-	1,045
In four-story buildings,	2	255	330	250	210	-	1,045
Totals,	119	1,437	1,654	800	370	3	4,264

Means of Escape in case of Fire.

CLASSIFICATION.	Means of Escape.				
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.	Tower stairways.
From second story—					
For 5 or less persons,	24	-	-	1	2
For 6 to 20 persons,	13	-	-	-	-
For 21 to 100 persons,	5 3 f. e.	2	-	2	5 1 f. e.
For 101 to 300 persons,	1 f. e.	1	1 f. e.	-	1 f. e.
From third story—					
For 5 or less persons,	4 1 f. e.	2	-	-	1
For 6 to 20 persons,	6 2 f. e.	2	-	1	2
For 21 to 100 persons,	5	-	2 f. e.	-	2 f. e.
For 101 to 300 persons,	-	-	-	-	1 f. e.
From fourth story—					
For 6 to 20 persons,	1 1 f. e.	1	-	2 f. e. 1	1
For 21 to 100 persons,	-	1	1 f. e.	-	1 f. e
For 101 to 300 persons,	-	-	-	-	1
From fifth story—					
For 5 or less persons,	-	-	-	-	1 f. e

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 5 or less persons,	102	186	50	22	-	-	258
In one-story buildings,	80	178	-	-	-	-	178
In two-story buildings,	14	8	45	-	-	-	53
In three-story buildings,	8	-	5	22	-	-	27
Employing 6 to 20 persons,	32	174	141	24	-	-	339
In one-story buildings,	13	127	-	-	-	-	127
In two-story buildings,	14	35	116	-	-	-	151
In three-story buildings,	5	12	25	24	-	-	61
Employing 21 to 100 persons,	9	147	105	55	-	-	307
In one-story buildings,	2	63	-	-	-	-	63
In two-story buildings,	4	54	66	-	-	-	120
In three-story buildings,	3	30	39	55	-	-	124
Employing 101 to 300 persons,	5	229	227	140	87	4	687
In three-story buildings,	1	88	36	14	-	-	138
In four-story buildings,	3	99	172	76	73	-	420
In five-story buildings,	1	42	19	50	14	4	129
Totals,	148	736	523	241	87	4	1,591

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.			
	One inside stairway.	Three inside stairways.	Outside stairway.	Tower stairways.
From second story—				
For 5 or less persons,	21	-	-	-
For 6 to 20 persons,	20	-	1	-
For 21 to 100 persons,	2 f. e.	1 f. e.	-	2 f. e.
From third story—				
For 5 or less persons,	11 1 f. e.	-	-	-
For 6 to 20 persons,	3	-	-	2 f. e.
For 21 to 100 persons,	2 f. e. 1	-	-	1 f. e.
From fourth story—				
For 5 or less persons,	1	-	-	-
For 6 to 20 persons,	1 f. e.	-	-	-
For 21 to 100 persons,	1	-	-	1 f. e.
From fifth story—				
For 5 or less persons,	1	-	-	-

TOWN OF ATTLEBOROUGH, BRISTOL COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 5 or less persons, . .	6	13	8	5	-	-	21
In one-story buildings, . .	3	11	-	-	-	-	11
In two-story buildings, . .	2	2	3	-	-	-	5
In three-story buildings, . .	1	-	-	5	-	-	5
Employing 6 to 20 persons, . .	15	73	78	20	-	-	171
In one-story buildings, . .	6	60	-	-	-	-	60
In two-story buildings, . .	8	13	78	-	-	-	91
In three-story buildings, . .	1	-	-	20	-	-	20
Employing 21 to 100 persons, . .	17	229	318	132	10	6	690
In two-story buildings, . .	10	125	275	-	-	-	400
In three-story buildings, . .	6	100	12	110	-	-	222
In five-story buildings, . .	1	4	26	22	10	6	68
Employing 101 to 300 persons, .	3	125	77	88	36	33	359
In one-story buildings, . .	1	125	-	-	-	-	125
In three-story buildings, . .	1	-	60	65	-	-	125
In five-story buildings, . .	1	-	17	23	36	33	109
Totals, ...	41	440	471	245	46	39	1,241

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Two inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—					
For 5 or less persons, . .	3	-	-	-	-
For 6 to 20 persons, . . .	6 1 f. e.	-	2	1	-
For 21 to 100 persons, . .	5	1	-	2 f. e.	1 f. e.
From third story—					
For 5 or less persons, . .	1	-	-	-	1
For 6 to 20 persons, . . .	-	-	-	1 f. e.	-
For 21 to 100 persons, . .	2 1 f. e.	-	-	1 1 f. e.	1
From fourth story—					
For 6 to 20 persons, . . .	-	-	-	1 f. e.	-
For 21 to 100 persons, . .	1 f. e.	-	-	-	-
From fifth story—					
For 6 to 20 persons, . . .	-	-	-	1 f. e.	-
For 21 to 100 persons, . .	1 f. e.	-	-	-	-

TOWN OF BEVERLY, ESSEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY. 1st.	2d.	3d.	4th.	Totals.
Employing 6 to 20 persons,	9	58	33	10	-	101
In one-story buildings,	3	40	-	-	-	40
In two-story buildings,	3	15	22	-	-	37
In three-story buildings,	3	3	11	10	-	24
Employing 21 to 100 persons,	16	127	367	324	40	858
In two-story buildings,	4	45	98	-	-	143
In three-story buildings,	10	66	243	284	-	593
In four-story buildings,	2	16	26	40	40	122
Employing 101 to 300 persons,	1	10	15	75	50	150
In four-story buildings,	1	10	15	75	50	150
Totals,	26	195	415	409	90	1,109

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE. One inside stairway.	Outside stairway.	Inside and outside stairways.
From second story—			
For 5 or less persons,	3	-	-
For 6 to 20 persons,	9	1	2
For 21 to 100 persons,	7	-	-
From third story—			
For 5 or less persons,	1	-	-
For 6 to 20 persons,	6	1	-
For 21 to 100 persons,	8	-	-
From fourth story—			
For 6 to 20 persons,	1	-	-
For 21 to 100 persons,	2	-	-

TOWN OF MARBLEHEAD, ESSEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY. 1st.	2d.	3d.	4th.	Totals.
Employing 6 to 20 persons,	13	7	160	9	-	176
In two-story buildings,	12	4	152	-	-	156
In three-story buildings,	1	3	8	9	-	20
Employing 21 to 100 persons,	14	22	206	422	170	820
In two-story buildings,	4	-	150	-	-	150
In three-story buildings,	9	22	36	359	-	417
In four-story buildings,	1	-	20	63	170	253
Employing 101 to 300 persons,	1	45	88	97	117	347
In four-story buildings,	1	45	88	97	117	347
Totals,	28	74	454	528	287	1,343

Marblehead—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.		
	One inside stairway.	Two inside stairways.	Three inside stairways.
From second story—			
For 6 to 20 persons,	17	-	-
For 21 to 100 persons,	6	-	-
From third story—			
For 6 to 20 persons,	2	-	-
For 21 to 100 persons,	8	2	1
From fourth story—			
For 21 to 100 persons,	3	2	-

TOWN OF NORTH ANDOVER, ESSEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 21 to 100 persons,	3	56	77	59	57	5	254
In four-story buildings,	2	40	44	50	43	-	177
In five-story buildings,	1	16	33	9	14	5	77
Employing over 300 persons,	1	200	150	120	50	-	520
In four-story buildings,	1	200	150	120	50	-	520
Totals,	4	256	227	179	107	5	774

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.	
	One inside stairway.	Tower stairways.
From second story—		
For 6 to 20 persons,	-	1 f. e.
For 21 to 100 persons,	1 f. e.	1 f. e.
For 101 to 300 persons,	1 f. e.	-
From third story—		
For 6 to 20 persons,	1 f. e.	1 f. e.
For 21 to 100 persons,	-	1 f. e.
For 101 to 300 persons,	2 f. e.	-
From fourth story—		
For 6 to 20 persons,	1 f. e.	1 f. e.
For 21 to 100 persons,	1 f. e.	1 f. e.
From fifth story—		
For 5 or less persons,	1 f. e.	-

TOWN OF CHICOPEE, HAMPDEN COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 21 to 100 persons,	5	98	74	76	11	-	259
In two-story buildings,	1	33	17	-	-	-	50
In three-story buildings,	2	43	30	47	-	-	120
In four-story buildings,	2	22	27	29	11	-	89
Employing 101 to 300 persons,	1	130	70	75	-	-	275
In three-story buildings,	1	130	70	75	-	-	275
Employing over 300 persons,	2	527	782	443	330	314	2,396
In five-story buildings,	2	527	782	443	330	314	2,396
Totals,	8	755	926	594	341	314	2,930

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.						
	One inside stairway.	Two inside stairways.	Three inside stairways.	Five inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—							
For 5 or less persons,	-	1	-	-	-	-	-
For 6 to 20 persons,	1 f. e.	-	1 f. e.	-	-	-	1
For 21 to 100 persons,	-	1 f. e.	-	-	1 f. e.	-	-
For over 300 persons,	-	-	1 f. e.	1 f. e.	-	-	-
From third story—							
For 6 to 20 persons,	1 f. e.	1	-	-	-	-	1
For 21 to 100 persons,	-	1 f. e.	-	-	-	1 f. e.	-
For 101 to 300 persons,	-	-	1 f. e.	-	-	-	-
For over 300 persons,	-	-	-	1 f. e.	-	-	-
From fourth story—							
For 5 or less persons,	-	1	-	-	-	-	-
For 6 to 20 persons,	1 f. e.	-	-	-	-	-	-
For 101 to 300 persons,	-	-	-	1 f. e.	-	2 f. e.	-
From fifth story—							
For 21 to 100 persons,	-	-	1 f. e.	1 f. e.	-	-	-

TOWN OF NORTHAMPTON, HAMPSHIRE COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.				Totals.
		1st.	2d.	3d.	4th.	
Employing 21 to 100 persons,	4	113	131	37	23	304
In two-story buildings,	2	66	84	-	-	150
In four-story buildings,	2	47	47	37	23	154
Employing 101 to 300 persons,	3	223	215	20	-	458
In two-story buildings,	2	143	175	-	-	318
In three-story buildings,	1	80	40	20	-	140
Totals,	7	336	346	57	23	762

Northampton—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.		
	One inside stairway.	Two inside stairways.	Tower stairways.
From second story—			
For 6 to 20 persons,	-	-	1
For 21 to 100 persons,	1 1 f. e.	1	1 2 f. e.
From third story—			
For 6 to 20 persons,	-	1	1 f. e.
For 21 to 100 persons,	-	-	1
From fourth story—			
For 6 to 20 persons,	-	-	1 1 f. e.

TOWN OF MALDEN, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.				Totals.
		1st.	2d.	3d.	4th.	
Employing 6 to 20 persons,	5	41	27	4	-	72
In one-story buildings,	1	14	-	-	-	14
In two-story buildings,	3	15	24	-	-	39
In three-story buildings,	1	12	3	4	-	19
Employing 21 to 100 persons,	3	77	68	31	25	201
In three-story buildings,	2	17	28	6	-	51
In four-story buildings,	1	60	40	25	25	150
Employing over 300 persons,	1	107	87	339	6	539
In four-story buildings,	1	107	87	339	6	539
Totals,	9	225	182	374	31	812

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.		
	One inside stairway.	Two inside stairways.	Inside and outside stairways.
From second story—			
For 5 or less persons,	1 f. e.	-	-
For 6 to 20 persons,	5	-	-
For 21 to 100 persons,	-	1	1 f. e.
From third story—			
For 5 or less persons,	2 1 f. e.	-	-
For 21 to 100 persons,	-	-	1 f. e.
For over 300 persons,	-	1	-
From fourth story—			
For 6 to 20 persons,	-	1	-
For 21 to 100 persons,	-	-	1 f. e.

TOWN OF MARLBOROUGH, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish't's.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 6 to 20 persons,	1	10	8	-	-	-	18
In two-story buildings,	1	10	8	-	-	-	18
Employing 21 to 100 persons,	4	90	70	85	10	-	255
In three-story buildings,	3	55	55	60	-	-	170
In four-story buildings,	1	35	15	25	10	-	85
Employing 101 to 300 persons,	11	223	482	535	303	25	1,568
In four-story buildings,	9	192	387	480	234	-	1,293
In five-story buildings,	2	31	95	55	69	25	275
Employing over 300 persons,	1	61	168	159	31	71	490
In five-story buildings,	1	61	168	159	31	71	490
Totals,	17	384	728	779	344	96	2,331

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.			
	One inside stairway.	Two inside stairways.	Three inside stairways.	Outside stairway.
From second story—				
For 6 to 20 persons,	2	2	-	1 f. e.
For 21 to 100 persons,	3	2	1	-
For 101 to 300 persons,	-	1	-	-
From third story—				
For 6 to 20 persons,	2	1	-	-
For 21 to 100 persons,	3	3	-	1
For 101 to 300 persons,	-	1	-	-
From fourth story—				
For 6 to 20 persons,	3 1 f. e.	1	-	-
For 21 to 100 persons,	5	3	-	-
From fifth story—				
For 6 to 20 persons,	1	-	-	-
For 21 to 100 persons,	-	1	-	-

TOWN OF NATICK, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish't's.	PERSONS EMPLOYED IN EACH STORY.				Totals.
		1st.	2d.	3d.	4th.	
Employing 6 to 20 persons,	6	35	37	18	8	98
In two-story buildings,	3	30	24	-	-	54
In three-story buildings,	2	2	7	16	-	25
In four-story buildings,	1	3	6	2	8	19
Employing 21 to 100 persons,	7	99	148	135	79	461
In two-story buildings,	1	40	37	-	-	77
In three-story buildings,	2	23	45	42	-	110
In four-story buildings,	4	36	66	93	79	274
Employing 101 to 300 persons,	1	27	42	38	10	117
In four-story buildings,	1	27	42	38	10	117
Totals,	14	161	227	191	97	676

Natick—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE. One inside stairway.	MEANS OF ESCAPE. Outside stairway.
From second story—		
For 6 to 20 persons,	7	1
For 21 to 100 persons,	4	-
From third story—		
For 5 or less persons,	2	-
For 6 to 20 persons,	1 f. e. 3	-
For 21 to 100 persons,	4	-
From fourth story—		
For 6 to 20 persons,	5	-
For 21 to 100 persons,	1	-

TOWN OF STONEHAM, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY. 1st.	2d.	3d.	4th.	Totals.
Employing 6 to 20 persons,	6	20	21	27	20	88
In two-story buildings,	1	2	5	-	-	7
In three-story buildings,	4	18	16	27	-	61
In four-story buildings,	1	-	-	-	20	20
Employing 21 to 100 persons,	15	183	189	197	127	646
In one-story buildings,	1	25	-	-	-	25
In three-story buildings,	6	68	141	50	-	259
In four-story buildings,	8	40	48	147	127	362
Employing 101 to 300 persons,	4	87	96	229	158	570
In three-story buildings,	1	50	25	100	-	175
In four-story buildings,	3	37	71	129	158	395
Totals,	25	240	306	453	305	1,304

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE. One inside stairway.	Outside stairway.	Inside and outside stairways.
From second story—			
For 5 or less persons,	5	1	-
For 6 to 20 persons,	6	1	2
For 21 to 100 persons,	4	2	1
From third story—			
For 5 or less persons,	3	1	-
For 6 to 20 persons,	7	-	-
For 21 to 100 persons,	1	-	-
From fourth story—			
For 6 to 20 persons,	6	-	-
For 21 to 100 persons,	6	-	-

TOWN OF WALTHAM, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 6 to 20 persons,	5	32	37	-	-	-	69
In one-story buildings,	1	20	-	-	-	-	20
In two-story buildings,	4	12	37	-	-	-	49
Employing 101 to 300 persons,	1	80	80	35	-	-	195
In three-story buildings,	1	80	80	35	-	-	195
Employing over 300 persons,	2	796	562	250	123	23	1,754
In three-story buildings,	1	350	300	100	-	-	750
In five-story buildings,	1	446	262	150	123	23	1,004
Totals,	8	908	679	285	123	23	2,018

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.				
	One inside stairway.	Three inside stairways.	Outside stairway.	Tower stairways.	Inside and outside stairways.
From second story—					
For 6 to 20 persons,	2	-	1	-	1
For 21 to 100 persons,	-	3	-	1	-
For 101 to 300 persons,	1 f. e.	-	-	1	-
From third story—					
For 21 to 100 persons,	3	-	-	1	-
For 101 to 300 persons,	1 f. e.	-	-	1 f. e.	-
From fourth story—					
For 101 to 300 persons,	1 f. e.	-	-	1	-
From fifth story—					
For 21 to 100 persons,	1 f. e.	-	-	1 f. e.	-

TOWN OF WOBURN, MIDDLESEX COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 6 to 20 persons,	10	57	47	16	2	-	122
In one-story buildings,	1	17	-	-	-	-	17
In two-story buildings,	3	21	17	-	-	-	38
In three-story buildings,	5	16	27	14	-	-	57
In four-story buildings,	1	3	3	2	2	-	10
Employing 21 to 100 persons,	17	213	270	183	27	-	693
In two-story buildings,	4	43	78	-	-	-	121
In three-story buildings,	6	59	115	77	-	-	251
In four-story buildings,	7	111	77	106	27	-	321
Employing 101 to 300 persons,	2	35	55	170	12	30	302
In five-story buildings,	2	35	55	170	12	30	302
Totals,	29	305	372	369	41	30	1,117

Woburn—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.		
	One inside stairway.	Two inside stairways.	Outside stairway.
From second story—			
For 5 or less persons,	3	1	1
For 6 to 20 persons,	13 2 f. e.	3	-
For 21 to 100 persons,	3	2	-
From third story—			
For 5 or less persons,	7	2	-
For 6 to 20 persons,	5 1 f. e.	3	-
For 21 to 100 persons,	1	1	-
For 101 to 300 persons,	1	-	-
From fourth story—			
For 5 or less persons,	7	1	-
For 6 to 20 persons,	-	1	-
For 21 to 100 persons,	1,	-	-
From fifth story—			
For 6 to 20 persons,	1	1	-

TOWN OF WEYMOUTH, NORFOLK COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 6 to 20 persons,	16	48	119	42	-	-	209
In two-story buildings,	8	26	73	-	-	-	99
In three-story buildings,	8	22	46	42	-	-	110
Employing 21 to 100 persons,	21	134	291	228	139	10	802
In two-story buildings,	4	21	76	-	-	-	97
In three-story buildings,	9	75	138	123	-	-	336
In four-story buildings,	7	36	75	99	119	-	329
In five-story buildings,	1	2	2	6	20	10	40
Employing 101 to 300 persons,	4	244	86	90	122	-	542
In one-story buildings,	1	191	-	-	-	-	191
In four-story buildings,	3	53	86	90	122	-	351
Totals,	41	426	496	360	261	10	1,553

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.	
	One inside stairway.	Two inside stairways.
From second story—		
For 5 or less persons,	4	-
For 6 to 20 persons,	27	1
For 21 to 100 persons,	6 1 f. e.	-
From third story—		
For 5 or less persons,	9	-
For 6 to 20 persons,	15	-
For 21 to 100 persons,	4 1 f. e.	-
From fourth story—		
For 5 or less persons,	3	-
For 6 to 20 persons,	4	-
For 21 to 100 persons,	4	1
From fifth story—		
For 6 to 20 persons,	1	-

Town of Brockton, Plymouth County.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	Persons Employed in each Story.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 6 to 20 persons,	6	30	32	7	15	-	84
In two-story buildings,	2	15	13	-	-	-	28
In three-story buildings,	1	6	4	1	-	-	11
In four-story buildings,	3	9	15	6	15	-	45
Employing 21 to 100 persons,	26	302	300	406	264	-	1,272
In two-story buildings,	2	21	33	-	-	-	54
In three-story buildings,	11	165	153	211	-	-	529
In four-story buildings,	13	116	114	195	264	-	689
Employing 101 to 300 persons,	5	197	106	284	273	-	860
In four-story buildings,	5	197	106	284	273	-	860
Employing over 300 persons,	1	30	-	100	85	160	375
In five-story buildings,	1	30	-	100	85	160	375
Totals,	38	559	438	797	637	160	2,591

Means of Escape in case of Fire.

CLASSIFICATION.	Means of Escape.			
	One inside stairway.	Two inside stairways.	Outside stairway.	Inside and outside stairways.
From second story—				
For 5 or less persons,	8 1 f. e.	-	-	-
For 6 to 20 persons,	15	-	2	4
For 21 to 100 persons,	2	-	-	3
From third story—				
For 5 or less persons,	3	-	-	2
For 6 to 20 persons,	18	3	-	-
For 21 to 100 persons,	5 1 f. e.	-	-	-
From fourth story—				
For 5 or less persons,	2	-	-	-
For 6 to 20 persons,	11	-	-	-
For 21 to 100 persons,	8 1 f. e.	-	-	-
From fifth story—				
For 101 to 300 persons,	1	-	-	-

Town of Blackstone, Worcester County.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	Persons Employed in each Story.						Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	
Employing 6 to 20 persons,	3	25	15	8	-	-	-	48
In two-story buildings,	2	25	10	-	-	-	-	35
In three-story buildings,	1	-	5	8	-	-	-	13
Employing 21 to 100 persons,	3	30	55	10	5	-	-	100
In two-story buildings,	1	10	20	-	-	-	-	30
In three-story buildings,	1	15	7	2	-	-	-	24
In four-story buildings,	1	5	28	8	5	-	-	46
Employing 101 to 300 persons,	2	139	156	41	32	-	-	368
In four-story buildings,	2	139	156	41	32	-	-	368
Employing over 300 persons,	1	83	213	135	123	123	106	783
In six-story buildings,	1	83	213	135	123	123	106	783
Totals,	9	277	439	194	160	123	106	1,299

Blackstone—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.	
	One inside stairway.	Tower stairways.
From second story—		
For 5 or less persons,	3	-
For 6 to 20 persons,	2	-
For 21 to 100 persons,	1 f. e.	-
For 101 to 300 persons,	1 f. e.	1 f. e.
From third story—		
For 5 or less persons,	1	-
For 6 to 20 persons,	2 1 f. e.	-
For 21 to 100 persons,	1 f. e.	-
For 101 to 300 persons,	-	1 f. e.
From fourth story—		
For 5 or less persons,	1	-
For 6 to 20 persons,	1 f. e.	-
For 21 to 100 persons,	1 f. e.	-
For 101 to 300 persons,	-	1 f. e.
From fifth story—		
For 101 to 300 persons,	-	1 f. e.
From sixth story—		
For 101 to 300 persons,	-	1 f. e.

TOWN OF MILFORD, WORCESTER COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 6 to 20 persons,	10	31	45	36	19	-	131
In one-story buildings,	1	8	-	-	-	-	8
In two-story buildings,	2	10	22	-	-	-	32
In three-story buildings,	3	5	10	21	-	-	36
In four-story buildings,	4	8	13	15	19	-	55
Employing 21 to 100 persons,	13	185	135	98	67	-	485
In two-story buildings,	4	81	29	-	-	-	110
In three-story buildings,	3	61	28	41	-	-	130
In four-story buildings,	6	43	78	57	67	-	245
Employing 101 to 300 persons,	5	106	146	98	209	129	688
In four-story buildings,	1	10	20	8	70	-	108
In five-story buildings,	4	96	126	90	139	129	580
Totals,	28	322	326	232	295	129	1,304

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.			
	One inside stairway.	Two inside stairways.	Outside stairway.	Inside and outside stairways.
From second story—				
For 5 or less persons,	7	-	2	-
For 6 to 20 persons,	6	3	-	3
For 21 to 100 persons,	1 f. e.	1	1	1
From third story—				
For 5 or less persons,	8	-	-	-

Milford—Means of Escape in case of Fire—Continued.

CLASSIFICATION.	MEANS OF ESCAPE.			
	One inside stairway.	Two inside stairways.	Outside stairway.	Inside and outside stairways.
From third story—Con.				
For 6 to 20 persons,	9	2 f. e. 1	-	-
For 21 to 100 persons,	1 f. e.	1	-	-
From fourth story—				
For 5 or less persons,	5	-	-	-
For 6 to 20 persons,	4	-	-	-
For 21 to 100 persons,	5	1	-	-
From fifth story—				
For 6 to 20 persons,	1	-	-	-
For 21 to 100 persons,	2	1	-	-

TOWN OF MILLBURY, WORCESTER COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.				Totals.
		1st.	2d.	3d.	4th.	
Employing 21 to 100 persons,	8	212	181	89	53	535
In two-story buildings,	1	60	40	-	-	100
In three-story buildings,	2	75	25	15	-	115
In four-story buildings,	5	77	116	74	53	320
Employing 101 to 300 persons,	5	207	220	106	50	583
In four-story buildings,	5	207	220	106	50	583
Totals,	13	419	401	195	103	1,118

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.		
	One inside stairway.	Two inside stairways.	Tower stairways.
From second story—			
For 6 to 20 persons,	1 1 f. e.	-	2 f. e.
For 21 to 100 persons,	1	1 f. e.	7 f. e.
From third story—			
For 6 to 20 persons,	1 1 f. e.	1 f. e.	6 f. e.
For 21 to 100 persons,	-	-	8 f. e.
From fourth story—			
For 5 or less persons,	-	-	3
For 6 to 20 persons,	1 f. e.	1 f. e.	5 f. e.

TOWN OF SOUTHBRIDGE, WORCESTER COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 21 to 100 persons,	2	65	51	-	-	-	116
In two-story buildings,	2	65	51	-	-	-	116
Employing 101 to 300 persons,	4	269	282	138	27	-	716
In two-story buildings,	1	84	46	-	-	-	130
In three-story buildings,	1	19	44	70	-	-	133
In four-story buildings,	2	166	192	68	27	-	453
Employing over 300 persons,	1	186	217	223	124	59	809
In five-story buildings,	1	186	217	223	124	59	809
Totals,	7	520	550	361	151	59	1,641

Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.		
	One inside stairway.	Two inside stairways.	Tower stairways.
From second story—			
For 6 to 20 persons,	-	1	-
For 21 to 100 persons,	1 1 f. e.	1 f. e.	1 f. e.
For 101 to 300 persons,	1 f. e.	-	1 f. e.
From third story—			
For 5 or less persons,	-	1	-
For 21 to 100 persons,	1 f. e.	-	1 f. e.
For 101 to 300 persons,	-	-	1 f. e.
From fourth story—			
For 5 or less persons,	1 f. e.	-	-
For 21 to 100 persons,	1 f. e.	-	-
For 101 to 300 persons,	1 f. e.	-	-
From fifth story—			
For 21 to 100 persons,	-	-	1 f. e.

TOWN OF WESTBOROUGH, WORCESTER COUNTY.

Persons Employed in each Story.

CLASSIFICATION.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.					Totals.
		1st.	2d.	3d.	4th.	5th.	
Employing 6 to 20 persons,	1	5	5	5	-	-	15
In three-story buildings,	1	5	5	5	-	-	15
Employing 21 to 100 persons,	1	8	20	40	-	-	68
In three-story buildings,	1	8	20	40	-	-	68
Employing 101 to 300 persons,	2	49	70	85	100	12	316
In three-story buildings,	1	25	40	55	-	-	120
In five-story buildings,	1	24	30	30	100	12	196
Employing over 300 persons,	1	90	70	170	160	32	522
In five-story buildings,	1	90	70	170	160	32	522
Totals,	5	152	165	300	260	44	921

Westborough—Means of Escape in case of Fire.

CLASSIFICATION.	MEANS OF ESCAPE.		
	One inside stairway.	Outside stairways.	Tower stairways.
From second story—			
For 5 or less persons,	1	-	-
For 6 to 20 persons,	1	-	-
For 21 to 100 persons,	1	1	1
From third story—			
For 5 or less persons,	1	-	-
For 21 to 100 persons,	3	-	-
For 101 to 300 persons,	-	-	1
From fourth story—			
For 21 to 100 persons,	1	-	-
For 101 to 300 persons,	-	-	1
From fifth story—			
For 6 to 20 persons,	1	-	-
For 21 to 100 persons,	-	-	1

NOTES ON THE PRECEDING TABLES.

FALL RIVER (page 234). The whole number of establishments tabulated, is 241. The number of these employing 21 persons and upwards, is 59, divided among the following industries:—Cotton goods, 38; machinery, 3; woollen goods, 1; iron work, 5; blacksmithing, 1; bleaching and finishing, 1; carpentry and joinery, 2; roll covering, 1; masoning, 2; loom harnesses, 2; repairing top-rolls, 1; clothing, 2. The whole number of persons employed, is 16,594. The 59 establishments mentioned as having 21 or more workmen, employ 15,657 of these. The number of persons employed in third stories and stories above the third, is 7,538, and they are engaged in the following kinds of work:—Clothing, carriages, carpentry, butchering, tinsmithing, roll-covering, loom harnesses, card clothing, leather belting, job printing, cotton goods, machinery, bleaching and finishing, iron goods, woollen goods.

NEW BEDFORD (page 235). The whole number of establishments tabulated, is 242. The number of these employing 21 persons and upwards, is 27, divided among the following industries:—Ship building and repairing, 2; railroad cars, 1; iron goods, 2; rolled metal, 1; tin and sheet iron ware, 1; sperm and whale oil, 2; food preparations, 2; carriages, 2; sails, 1; leather, 2; newspapers, 1; clothing, 1; boots and shoes, 2; picture frames, 2; rope and cordage, 1; drills and chucks, 1; glass, 1; cotton goods, 2. The whole number of persons employed, is 4,642. The 27 establishments mentioned as having 21 or more workmen, employ 3,458 of these. The number of persons employed in third stories and stories above the third, is 1,586, and they are engaged in the following kinds of work:—Carriages, coffee and spices, tin and sheet iron ware, paraffine wax and candles, clothing, sperm and whale oil, sails, leather, newspapers, boots and shoes, picture frames, rope and cordage, drills and chucks, glass, cotton goods.

TAUNTON (page 236). The whole number of establishments tabulated, is 134. The number of these employing 21 persons and upward, is 21, divided among the following industries:—Bricks, 2; cotton goods, 4; iron goods, 8; britannia goods, 1; locomotives and machinery, 2; copper and yellow metal work, 1; silver-plated ware, 1; carpentry, 2. The whole number of persons employed, is 3,568. The 21 establishments mentioned as having 21 or more workmen, employ 2,826 of these. The number of persons employed in third stories and stories above the third, is 767, and they are engaged in the following kinds of work:—Painting, stove polish, clothing, iron goods, enamelled cloth, britannia ware, cotton goods, silver-plated ware, locomotives and machinery.

GLOUCESTER (page 237). The whole number of establishments tabulated, is 105. The number of these employing 21 persons and upward, is 5, divided among the following industries:—Stone cutting, 1; boats, 1; vessels, 1; oiled clothing, 2. The whole number of persons employed, is 671. The 5 establishments mentioned as having 21 or more workmen, employ 193 of these. The number of persons employed in third stories and stories above the third, is 22, and they are engaged in the following kinds of work:—Nets and seines, sails, tinware, oiled clothing, carpentry.

Haverhill (page 238). The whole number of establishments tabulated, is 317. The number of these employing 21 persons and upward, is 38, divided among the following industries:—Boots and shoes, 32; leather, 1; bonnets and hats, 1; shoe bows, 1; flannels, 1; wool hats, 2. The whole number of persons employed, is 3,118. The 38 establishments mentioned as having 21 or more workmen, employ 1,737 of these. The number of persons employed in third stories and stories above the third, is 1,407, and they are engaged in the following kinds of work:—Newspapers, tinware, cut sole leather, boots and shoes, photographs, furnaces and stoves, wooden boxes, wool hats, paper boxes, carriages, clothing, leather, watch and clock repairing, painting, bonnets and hats, shoe bows, flannels.

Lawrence (page 239). The whole number of establishments tabulated, is 214. The number of these employing 21 persons and upward, is 26, divided among the following industries: —Carpentry, 1; iron work, 2; builders' materials, 1; bread, etc., 1; lumber, 1; paper, 3; worsted goods, 3; steam engines, 1; carriages, 1; bobbins and spools, 1; wood boxes, 1; loom harnesses, 1; shoe machinery, 1; woollen goods, 2; cotton goods, 3; cotton and woollen goods, 2; cotton and worsted goods, 1. The whole number of persons employed, is 12,072. The 26 establishments mentioned as having 21 or more workmen, employ 11,255 of these. The number of persons employed in third stories and stories above the third, is 5,044, and they are engaged in the following kinds of work:—Boots and shoes, bookbinding, furniture, leather belting, wood work, photographs, picture frames, furnaces and stoves, clothing, job printing, steam governors, carriages, ale, files, iron hubbed wheels, card clothing, iron work, worsted goods, loom harnesses, shoe machinery, woollen goods, cotton goods, cotton and woollen goods, paper.

Lynn (page 240). The whole number of establishments tabulated, is 502. The number of these employing 21 persons and upward, is 129, divided among the following industries:—Buildings, 2; boots and shoes, 87; shoe boxes, 1; clothing, 2; shoe trimmings, 1; goat, kid and morocco leather, 9; shoe stock, 1; shoe machinery, 1; furniture, 1; stitching boots and shoes, 24. The whole number of persons employed, is 10,305. The 129 establishments mentioned as having 21 or more workmen, employ 8,122 of these. The number of persons employed in third stories and stories above the third, is 5,513, and they are engaged in the following kinds of work:—Cutting shoe stock, steam and gas fitting, boots and shoes, heeling boots and shoes, stitching boots and shoes, carriages, machine needles, electric machines, job printing, furniture, photographs, stencils and steel letters, coffee and spices, clothing, stoves and furnaces, newspapers, wheels, goat, kid and morocco leather, bookbinding, paper boxes, shoe stock, shoe machinery.

Newburyport (page 241). The whole number of establishments tabulated, is 140. The number of these employing 21 persons and upward, is 16, divided among the following industries:—Ship building, 3; iron castings, 1; horn combs, 1; boots and shoes, 5; paper boxes, 1; wool hats, 1; cotton goods, 4. The whole number of persons employed, is 2,747. The 16 establishments mentioned as having 21 or more workmen, employ 2,056 of these. The number of persons employed in third stories and stories above the third, is 987, and they are engaged in the following kinds of work:—Photographs, tinware, clothing, sails, newspapers, ale, boots and shoes, paper boxes, wool hats, cotton goods, steam and gas fitting, carpentry, painting, rigging vessels.

Salem (page 242). The whole number of establishments tabulated, is 446. The number of these employing 21 persons and upward, is 32, divided among the following industries:—Clothing, 3; iron work, 1; shoe stock, 2; boots and shoes, 6; cigars, 1; leather, 10; buildings, 1; white lead, 2; builders' materials, 1; books, 1; railroad equipments, 2; gunny cloth, 1; cotton goods, 1. The whole number of persons employed, is 4,813. The 32 establishments mentioned as having 21 or more workmen, employ 2,784 of these. The number of persons employed in third stories and stories above the third, is 1,138, and they are engaged in the following kinds of work:—Painting, tinsmithing, upholstery, clothing, builders' materials, steam and water regulators, confectionery, coffins and caskets, photographs, shoe stock, jewelry, wagons, boots and shoes, newspapers, leather, white lead, books, railroad equipments, gunny cloth, cotton goods.

Holyoke (page 243). The whole number of establishments tabulated, is 27. The number of these employing 21 persons and upward, is 26, divided among the following industries:—Paper, 14; cotton goods, 4; wire goods, 1; woollen goods, 4; screws, 1; turbine water wheels, 1; worsted goods, 1. The whole number of persons employed, is 5,617. The 26 establishments mentioned as having 21 or more workmen, employ 5,601 of these. The number of persons employed in third stories and stories above the third, is 2,647, and they are engaged in the following kinds of work:—Paper, cotton goods, wire goods, woollen goods, screws, turbine water wheels, worsted goods.

Springfield (page 244). The whole number of establishments tabulated, is 438. The number of these employing 21 persons and upward, is 63, divided among the following industries:—Iron goods, 3; bricks, 3; brass goods, 1; drain pipe, 2; gas, 1; railroad equipments, 1; buildings, 7; harnesses, 2; paper boxes, 1; card board and paper, 2; newspapers, 1; clothing, 1; paper collars, 4; builders' materials, 2; gas machines, 1; crackers, 1; children's carriages, 1; cartridges, 1; jewelry, 1; cigars, 2; machine needles, 1; confectionery, 1; envelopes, 2; woollen goods, 1; games, 1; buttons, 2; watch movements, 1; blank books, 2; firearms, 1; cotton goods, 1; blacksmithing, 1; paving, 1; grading, 1; stone cutting, 2; gas fitting, 1; painting, 1. The whole number of persons employed, is 6,667. The 63 establishments mentioned as having 21 or more workmen, employ 4,771 of these. The number of persons employed in third stories and stories above the third, is 2,080, and they are engaged in the following kinds of work:—Photographs, artificial limbs, food preparations, tinware, etc., picture frames, medicines, jewelry, ale, carriages, iron work, paints, coffins, etc., mattresses and beds, trunks, cigars, paper collars and cuffs, builders' materials, paper, cartridges, water gates, machine needles, confectionery, buildings, envelopes, woollen goods, games, buttons, watch movements, blank books, firearms, cotton goods, clothing, gas fitting, job printing, painting, plumbing, cabinet making, electro-plating.

CAMBRIDGE (page 245). The whole number of establishments tabulated, is 334. The number of these employing 21 persons and upward, is 59, divided among the following industries:—Masoning, 2; stone cutting, 2; laundry work, 1; painting, 1; paving, 1; butchering, 1; gas, 1; steam radiators, 1; buildings, 2; monuments and headstones, 1; rolled iron, 1; furniture, 3; oleomargarine, 1; bricks, 6; iron work, 3; books, 4; wood work, 7; brushes, 2; calfskins, 1; bookbinding, 2; food preparations, 3; boots and shoes, 1; paper collars and cuffs, 1; britannia ware, 1; earthen ware, 1; coffins, 1; organ keys, 1; confectionery, 1; tinware, 1; ice, 2; barrels, 1; glass ware, 1; cabinet organs, 1. The whole number of persons employed, is 6,599. The 59 establishments mentioned as having 21 or more workmen, employ 5,176 of these. The number of persons employed in third stories and stories above the third, is 1,465, and they are engaged in the following kinds of work:—Carpet cleaning, bookbinding, plumbing, tinsmithing, laundry work, painting, furnace registers, steel engraving, piano-fortes, organs, leather, piano actions, job printing, astronomical instruments, carriages, brushes, food preparations, wood work, boots and shoes, furniture, paper collars and cuffs, earthen ware, coffins, buildings, organ keys, confectionery, steam radiators, books, glass ware.

LOWELL (page 246). The whole number of establishments tabulated, is 373. The number of these employing 21 persons and upward, is 72, divided among the following industries:—Woollen goods, 7; worsted goods, 3; carpets, 2; furniture, 3; wood work, 4; iron work, 6; clothing, 4; lumber, 4; job printing, 1; leather, 2; wire goods, 1; buildings, 3; loom harnesses, 1; suspenders, 2; cotton goods, 11; concrete pavement, 1; gas, 1; monuments, etc., 1; boots and shoes, 2; medicines, 1; machinery, 3; cartridges, 1; stone cutting, 2; painting, 2; carpentry, 2; plastering, 2. The whole number of persons employed, is 16,180. The 72 establishments mentioned as having 21 or more workmen, employ 14,566 of these. The number of persons employed in third stories and stories above the third, is 6,530, and they are engaged in the following kinds of work:—Photographing, tinsmithing, carpentry, painting, carriages, iron work, wood work, plumbing, woollen goods, cotton goods, worsted goods, carpets, furniture, machinery, clothing, loom harnesses, job printing, medicines, cartridges, suspenders, wire goods, perfumery, card clothing.

NEWTON (page 247). The whole number of establishments tabulated, is 93. The number of these employing 21 persons and upward, is 13, divided among the following industries:—Masoning, 1; carpentry, 1; buildings, 5; clothing, 1; telegraphic instruments, 1; braided cord, 1; machinery, 1; woollen hosiery and yarn, 1; cotton goods, 1. The whole number of persons employed, is 1,303. The 13 establishments mentioned as having 21 or more workmen, employ 796 of these. The number of persons employed in third stories and stories above the third, is 165, and they are engaged in the following kinds of work:—Brushes, clothing, telegraphic instruments, braided cord, cotton goods, woollen hosiery and yarn.

SOMERVILLE (page 248). The whole number of establishments tabulated, is 115. The number of these employing 21 persons and upward, is 16, divided among the following industries:—Drain building, 2; road building, 1; painting, 1; earthen ware, 1; bricks, 2; iron castings, 1; railroad spikes, 1; brass and copper tubes, 1; pickles, 1; leather, 1; lard, oil, etc., 2; glass ware, 2. The whole number of persons employed, is 1,781. The 16 establishments mentioned as having 21 or more workmen, employ 1,310 of these. The number of persons employed in third stories and stories above the third, is 163, and they are engaged in the following kinds of work:—Mats and matting, lard oil, etc., pickles, leather, fertilizers.

BOSTON (page 249). The whole number of establishments tabulated, is 4,516. The number of these employing 21 persons and upward, is 436, divided among the following industries:—Brass goods, 4; barrels, 1; brooms, 1; butchering, 1; building materials, 4; brushes, 4; britannia ware, 1; boots and shoes, 11; beverages, 12; buildings, 4; bookbinding, 13; beds and bedding, 4; books, 2; blowers, 1; bleaching, 2; chemicals, 1; cork, 1; crockery ware, 1;

carpentry, 15; carriages, 7; confectionery, 7; copper work, 3; cigars, 3; chromos, 2; cotton goods, 2; clothing, 76; dyestuffs, 3; engraving, 10; furs, 2; furniture, 25; food preparations, 12; files, 1; friction matches, 1; furnaces and stoves, 2; floor oil-cloth, 1; fertilizers, 1; gas, 5; gas fixtures, 1; gas fitting, 2; gilding,1; glass ware, 1; gold leaf, 1; hair goods, 2; heliotype prints, 1; iron work, 37; jute bags, 1; job printing, 10; jewelry, 5; lapidary work, 1; leather, 6; lead, 1; locomotives, 1; machinery, 3; marble goods, 8; metal goods, 1; men's hats, 3; musical instruments, 11; masoning, 2; newspapers, 8; nets and seines, 1; oakum, 1; oil, 3; printing presses, 1; painting, 12; paper goods, 6; printers' materials, 1; plumbers' materials, 2; plumbing, 8; roofing, 1; rope and cordage, 1; rubber goods, 4; railroad equipments, 2; stone cutting, 3; silver ware, 1; sewing-machines, 1; steam engines, 2; suspenders, 1; shoe stock, 1; statuary, 1; steamships, 1; ship trimmings, 1; soda-water apparatus, 1; surgical instruments, 2; soap, 1; sheet music, 1; stereotype plates, 2; steam pumps, 1; tinware, 3; tallow, 3; type, 1; trunks, 2; upholstering, 2; umbrellas, 1; wood work, 10; wire goods, 2; watch cases, 1. The whole number of persons employed, is 46,777. The 436 establishments mentioned as having 21 or more workmen, employ 27,115 of these. The number of persons employed in third stories and stories above the third, is 19,887, and they are engaged in the following kinds of work:—Beverages, buildings, boots and shoes, blacking, britannia ware, books, bookbinding, brass goods, brushes, billard tables, bedding, blowers, bleaching and dyeing, builders' materials, barrels, brooms, cotton goods, carriages, crockery ware, corks, chemicals, carpentry, coffee and spices, clothing, cigars, confectionery, coffins, carving, chromos, cleaning waste, clocks and watches, copper work, curtain fixtures, condiments, coopering, dyestuffs, draughting, drain pipe, extracts, etc., embroidery, engraving, furniture, food preparations, flags and banners, furs, friction matches, gas, glass ware, gilt mouldings, gold and silver leaf, gilding, hardware, hair work, harnesses and saddles, home games, iron work, ink, japanning, jute bags, jewelry, job printing, leather goods, leather, laundry work, locomotives, lithographs, lapidary work, leather dressing, linen hose, machinery, machines, medicines, men's hats, music sheets, musical instruments, novelty goods, newspapers, nets and seines, oakum, oil, photographs, pickles and preserves, plumbing, painting, paper goods, philosophical instruments, printers' materials, paints, patterns and models, roofing, rigging, refining saltpetre, railroad equipments, rubber goods, rope and cordage, refrigerators, rag sorting, razor strops, stone dressing, steam engines, shoe stock, silver ware, sails, stove polish, ship trimmings, stoves and furnaces, silk goods, suspenders, steam pumps, soap, signs, sewing-machines, soda-water apparatus, stereotype plates, trunks, type, upholstering, varnishing, wood work, wire goods, wax flowers, whalebone, white lead, window shades.

CHELSEA (page 250). The whole number of establishments tabulated, is 141. The number of these employing 21 persons and upward, is 16, divided among the following industries:—Bricks, 1; iron castings, 1; granite work, 1; leather, 2; type, 1; cheroots, 2; shoe counters, 1; furniture, 2; oil, 1; elastic webs, 1; stoves, etc., 1; dyeing, 2. The whole number of persons employed, is 1,717. The 16 establishments mentioned as having 21 or more workmen, employ 1,104 of these. The number of persons employed in third stories and stories above the third, is 266, and they are engaged in the following kinds of work:—Cheroots, dressed lumber, elastic webs, furniture, leather, newspapers, oil, organs, refrigerators, stoves, etc.

FITCHBURG (page 251). The whole number of establishments tabulated, is 158. The number of these employing 21 persons and upward, is 30, divided among the following industries:—Buildings, 1; carpentry, 1; cotton goods, 2; furniture, 2; job printing, 1; lumber, 1; machinery, 10; metals and metallic goods, 2; paper, 3; rattan goods, 1; shoes, 1; stone cutting, 1; woollen goods, 4. The whole number of persons employed, is 2,545. The 30 establishments mentioned as having 21 or more workmen, employ 1,963 of these. The number of persons employed in third stories and stories above the third, is 367, and they are engaged in the following kinds of work:—Building materials, carpentry, cotton goods, food preparations, furniture, job printing, lumber, machinery, metals and metallic goods, paper, photographs, rattan goods, shoes, woollen goods.

WORCESTER (page 252). The whole number of establishments tabulated, is 528. The number of these employing 21 persons and upward, is 97, divided among the following industries:—Agricultural implements, 1; buildings, 1; builders' materials, 1; boots and shoes, 22; butchering, 1; carpentry, 1; card clothing, 2; carpets, 1; cigars, 1; clothing, 4; cotton goods, 1; cotton and woollen goods, 5; corsets, 1; envelopes, 1; firearms, 2; furniture, 1; food preparations, 1; gas, 1; ice, 1; iron goods, 9; job printing, 1; leather, 1; machinery, 12; machinists' tools, 4; monuments, etc., 1; organs, 1; organ reeds, 2; paper boxes, 1; packing boxes, 1; picture frames, 1; presses, 1; railroad equipments, 2; shoe lasts, 1; steam engines, 1; wire goods, 2; wooden goods, 1; woollen goods, 5; worsted goods, 1. The whole number of persons employed, is 9,092. The 97 establishments mentioned as having 21 or more workmen, employ 6,966 of these. The number of persons employed in third stories and stories above the third, is 3,543, and they are engaged in the following kinds of work:—Beverages, buildings, bookbinding, brushes, butchering, builders' materials, boots and shoes, card clothing, carpets, cigars, cotton goods, clothing, coffee and spices, coffins, cotton and woollen goods, carpet making, dyeing and bleaching, draughting, engraving, firearms, food preparations, furniture, iron work, job printing, leather belting, locksmithing, machinery, metals, monuments, musical instruments, paper goods, photographs, plumbing, painting, railroad equipments, razor strops, stoves and furnaces, straw goods, tinsmithing, upholstering, wire goods, wood work, worsted goods, woollen goods.

Adams (page 254). The whole number of establishments tabulated, is 119. The number of these employing 21 persons and upward, is 27, divided among the following industries:—Boots and shoes, 7; cotton goods, 11; lime and lime casks, 1; machinery, 1; paper, 2; woollen goods, 5. The whole number of persons employed, is 4,264. The 27 establishments mentioned as having 21 or more workmen, employ 3,802 of these. The number of persons employed in third stories and stories above the third, is 1,178, and they are engaged in the following kinds of work:—Boots and shoes, carriages, cotton goods, food preparations, lumber, paper, painting, plumbing, tinsmithing, woollen goods.

Pittsfield (page 255). The whole number of establishments tabulated, is 148. The number of these employing 21 persons and upward, is 14, divided among the following industries: —Buildings, 1; boots and shoes, 2; cotton goods, 3; leather, 1; masoning, 2; painting, 1; woollen goods, 6; wooden goods, 1. The whole number of persons employed, is 1,591. The 14 establishments mentioned as having 21 or more workmen, employ 904 of these. The number of persons employed in third stories and stories above the third, is 332, and they are engaged in the following kinds of work:—Boots and shoes, carpentry, carriages, cotton goods, food preparations, harnesses and saddles, iron work, job printing, leather, photographs, painting, tinsmithing, woollen goods.

. **Attleborough** (page 256). The whole number of establishments tabulated, is 41. The number of these employing 21 persons and upward, is 20, divided among the following industries:—Cotton goods, 1; jewelry, 17; leather, 1; worsted and silk braid, 1. The whole number of persons employed, is 1,241. The 20 establishments mentioned as having 21 or more workmen, employ 1,049 of these. The number of persons employed in third stories and stories above the third, is 330, and they are engaged in the following kinds of work:—Cotton goods, jewelry, leather, worsted and silk braid.

Beverly (page 257). The whole number of establishments tabulated, is 26. The number of these employing 21 persons and upward, is 17, and they are all engaged in the manufacture of boots and shoes. The whole number of persons employed, is 1,109. The 17 establishments mentioned as having 21 or more workmen, employ 1,008 of these. The number of persons employed in third stories and stories above the third, is 499, and they are engaged in the manufacture of boots and shoes and morocco leather.

Marblehead (page 257). The whole number of establishments tabulated, is 28. The number of these employing 21 persons and upward, is 15, and they are all engaged in the manufacture of boots and shoes. The whole number of persons employed, is 1,343. The 15 establishments mentioned as having 21 or more workmen, employ 1,167 of these. The number of persons employed in third stories and stories above the third, is 815, and they are engaged in the manufacture of boots and shoes.

North Andover (page 258). The whole number of establishments tabulated, is 4, all of which employ 21 or more persons. Three of these establishments are devoted to the manufacture of woollen goods and one to machinery and card clothing. The whole number of persons employed, is 774. The number of persons employed in third stories and stories above the third, is 291, and they are engaged in the manufacture of woollen goods and machinery and card clothing.

Chicopee (page 259). The whole number of establishments tabulated, is 8 (all of which employ 21 or more persons), divided among the following industries:—Agricultural implements, 2; cabinet locks, etc., 1; cotton goods, 1; firearms, 1; knitting machines, 1; machinery, 1. The whole number of persons employed, is 2,930. The number of persons employed in third stories and stories above the third, is 1,249, and they are engaged in the following kinds of work:—Agricultural implements, cabinet locks, etc., cotton goods, firearms, knitting machines, machinery.

Northampton (page 259). The whole number of establishments tabulated, is 7 (all of which employ 21 or more persons), divided among the following industries:—Baskets, 1; buttons, 2; cotton goods, 1; cutlery, 1; hardware, 1; sewing machines, 1. The whole number of persons employed, is 762. The number of persons employed in third stories and stories above the third, is 80, and they are engaged in the following kinds of work:—Buttons, cotton goods, cutlery, sewing machines.

Malden (page 260). The whole number of establishments tabulated, is 9. The number of these employing 21 persons and upward, is 4, divided among the following industries:—Lasts and boot trees, 1; leather 2; rubber goods, 1. The whole number of persons employed, is 812. The 4 establishments mentioned as having 21 or more workmen, employ 740 of these. The number of persons employed in third stories and stories above the third, is 405, and they are engaged in the following kinds of work:—Emery and sand paper, leather, lasts and boot trees, rubber goods.

Marlborough (page 261). The whole number of establishments tabulated, is 17. The number of these employing 21 persons and upward, is 16, and they are all engaged in the manufacture of boots and shoes. The whole number of persons employed, is 2,331. The 16 establishments mentioned as having 21 or more workmen, employ 2,313 of these. The number of persons employed in third stories and stories above the third, is 1,219, and they are all engaged in the manufacture of boots and shoes.

Natick (page 261). The whole number of establishments tabulated, is 14. The number of these employing 21 persons and upward, is 8. Seven of these establishments manufacture boots and shoes, and one manufactures wool hats. The whole number of persons employed, is 676. The 8 establishments mentioned as having 21 or more workmen, employ 578 of these. The number of persons employed in third stories and stories above the third, is 288, and they are all engaged in the manufacture of boots and shoes.

Stoneham (page 262). The whole number of establishments tabulated, is 25. The number of these employing 21 persons and upward, is 19, divided among the following industries:—Boots and shoes, 16; leather, 2; shoe stock, 1. The whole number of persons employed, is 1,304. The 19 establishments mentioned as having 21 or more workmen, employ 1,216 of these. The number of persons employed in third stories and stories above the third, is 758, and they are engaged in the following kinds of work:—Boots and shoes, leather, shoe boxes, shoe stock.

Waltham (page 263). The whole number of establishments tabulated, is 8. The number of these employing 21 persons and upward, is 3, one being engaged in bleaching and dyeing, one in the manufacture of cotton goods, and one in the manufacture of watches. The whole number of persons employed, is 2,018. The 3 establishments mentioned as having 21 or more workmen, employ 1,949 of these. The number of persons employed in third stories and stories above the third, is 431, and they are engaged in bleaching and dyeing, the manufacture of cotton goods and of watches.

Woburn (page 263). The whole number of establishments tabulated, is 29. The number of these employing 21 persons and upward, is 19, divided among the following industries:—Boots and shoes, 1; leather, 15; shoe stock, 3. The whole number of persons employed, is 1,117. The 19 establishments mentioned as having 21 or more workmen, employ 995 of these. The number of persons employed in third stories and stories above the third, is 440, and they are engaged in the following kinds of work:—Leather, machinery, shoe stock.

Weymouth (page 264). The whole number of establishments tabulated, is 41. The number of these employing 21 persons and upward, is 25, divided among the following industries:—Boots and shoes, 23; cut nails, 1; fertilizers, 1. The whole number of persons employed, is 1,553. The 25 establishments mentioned as having 21 or more workmen, employ 1,344 of these. The number of persons employed in third stories and stories above the third, is 631, and they are engaged in the manufacture of boots and shoes and fertilizers.

Brockton (page 265). The whole number of establishments tabulated, is 38. The number of these employing 21 persons and upward, is 32, divided among the following industries:—Boots and shoes, 29; furniture, 1; sewing-machine needles, 2. The whole number of persons employed, is 2,591. The 32 establishments mentioned as having 21 or more workmen, employ 2,507 of these. The number of persons employed in third stories and stories above the third, is 1,587, and they are engaged in the following kinds of work:—Boots and shoes, furniture, sewing-machine needles.

Blackstone (page 265). The whole number of establishments tabulated, is 9. The number of these employing 21 persons and upward, is 6, divided among the following industries:—Cotton goods, 1; flocks, 1; woollen goods, 4. The whole number of persons employed, is 1,299. The 6 establishments mentioned as having 21 or more workmen, employ 1,251 of these. The number of persons employed in third stories and stories above the third, is 583, and they are engaged in the following kinds of work:—Cotton goods, flocks, woollen goods.

Milford (page 266). The whole number of establishments tabulated, is 28. The number of these employing 21 persons and upward, is 18, divided among the following industries:—Boots and shoes, 13; boot heels, 1; frame spindles, 1; machinery, 3. The whole number of persons employed, is 1,304. The 18 establishments mentioned as having 21 or more workmen, employ 1,173 of these. The number of persons employed in third stories and stories above the third, is 656, and they are engaged in the following kinds of work:—Boots and shoes, builders' finish, machinery, sewing-machine needles, shoe nails.

Millbury (page 267). The whole number of establishments tabulated, is 13, divided among the following industries:—Cotton goods, 6; hosiery, 1; woollen goods, 6. Each of these establishments employs 21 or more persons. The whole number of persons employed, is 1,118. The number of persons employed in third stories and stories above the third, is 298, and they are engaged in the following kinds of work:—Cotton goods, hosiery, woollen goods.

Southbridge (page 268). The whole number of establishments tabulated, is 7, divided among the following industries:—Cotton goods, 2; cotton and woollen goods, 1; calico printing, 1; printing reps and delaines, 1; shuttles, 1; spectacles, 1. Each of these establishments employs 21 or more persons. The whole number of persons employed, is 1,641. The number of persons employed in third stories and stories above the third, is 571, and they are engaged in the following kinds of work:—Cotton goods, cotton and woollen goods; printing reps and delaines, spectacles.

Westborough (page 268). The whole number of establishments tabulated, is 5. The number of these employing 21 persons and upward, is 4, divided among the following industries:—Boots and shoes, 2; straw bonnets and hats, 2. The whole number of persons employed, is 921. The 4 establishments mentioned as having 21 or more workmen, employ 906 of these. The number of persons employed in third stories and stories above the third, is 604, and they are engaged in the following kinds of work:—Boots and shoes, sleighs, straw bonnets and hats.

RECAPITULATIONS.

The tables previously given for the nineteen cities and twenty-one towns contain information, both of a general and detail nature. Each city or town showing supplies the material for a chart or plan, upon which, if constructed, we could see at a glance the location of the workmen in the various stories and the means provided for their safe exit, in case of fire or panic. The local details and comparisons, we necessarily leave for the consideration of those best acquainted with and most interested in them, either personally or officially. With the general points of information, we can readily form suggestive state recapitulations, which also enable us to institute comparisons between the various cities and towns as regards persons employed in the different stories, the average number of persons employed in establishments, the height of buildings and the means of escape by stairways and fire escapes. We also append tables which show the direction in which the outside doors of manufacturing establishments open, and the number of buildings having one story, two stories, etc.

The first tabular recapitulation which we present shows the number of establishments considered in the nineteen cities and twenty-one towns and the number of persons employed in each story of the buildings in which they are employed.

RECAPITULATION I.—*Persons Employed in each Story.*

CITIES AND TOWNS.	No. of Establish'ts.	PERSONS EMPLOYED IN EACH STORY.									Totals.
		1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	
CITIES.											
Fall River, . .	241	4,707	4,349	2,747	2,101	1,915	775	-	-	-	16,594
New Bedford, .	242	1,767	1,289	916	523	147	-	-	-	-	4,642
Taunton, . .	134	1,638	1,163	588	167	12	-	-	-	-	3,568
Gloucester, . .	105	460	189	22	-	-	-	-	-	-	671
Haverhill, . .	317	802	909	751	523	133	-	-	-	-	3,118
Lawrence, . .	214	3,651	3,377	2,340	1,350	458	468	336	92	-	12,072
Lynn, . . .	502	2,216	2,576	2,682	1,663	1,029	139	-	-	-	10,305
Newburyport, .	140	1,028	741	640	222	82	34	-	-	-	2,747
Salem, . . .	446	2,424	1,251	738	212	170	18	-	-	-	4,813
Holyoke, . .	27	1,389	1,581	1,350	865	319	113	-	-	-	5,617
Springfield, . .	438	3,306	1,281	1,122	604	201	153	-	-	-	6,667
Cambridge, . .	344	3,645	1,489	796	570	99	10	-	-	-	6,609
Lowell, . .	373	5,559	4,085	3,216	1,454	1,263	503	100	-	-	16,180
Newton, . .	93	888	250	87	78	-	-	-	-	-	1,303
Somerville, . .	115	1,390	228	104	40	19	-	-	-	-	1,781
Boston, . .	4,516	17,968	8,922	8,949	6,446	3,356	1,084	13	20	19	46,777
Chelsea, . .	141	1,109	342	217	49	-	-	-	-	-	1,717
Fitchburg, . .	158	1,471	707	325	42	-	-	-	-	-	2,545
Worcester, . .	528	3,517	2,032	2,045	1,046	452	-	-	-	-	9,092
Totals, . .	9,074	58,935	36,761	29,635	17,955	9,655	3,297	449	112	19	156,818
TOWNS.											
Adams, . .	119	1,437	1,654	800	370	3	-	-	-	-	4,264
Pittsfield, . .	148	736	523	241	87	4	-	-	-	-	1,591
Attleborough, .	41	440	471	245	46	39	-	-	-	-	1,241
Beverly, . .	26	195	415	409	90	-	-	-	-	-	1,109
Marblehead, .	28	74	454	528	287	-	-	-	-	-	1,343
North Andover, .	4	256	227	179	107	5	-	-	-	-	774
Chicopee, . .	8	755	926	594	341	314	-	-	-	-	2,930
Northampton, .	7	336	346	57	23	-	-	-	-	-	762
Malden, . .	9	225	182	374	31	-	-	-	-	-	812
Marlborough, .	17	384	728	779	344	96	-	-	-	-	2,331
Natick, . .	14	161	227	191	97	-	-	-	-	-	676
Stoneham, . .	25	240	306	453	305	-	-	-	-	-	1,304
Waltham, . .	8	908	679	285	123	23	-	-	-	-	2,018
Woburn, . .	29	305	372	369	41	30	-	-	-	-	1,117
Weymouth, .	41	426	496	360	261	10	-	-	-	-	1,553
Brockton, . .	38	559	438	797	637	160	-	-	-	-	2,591
Blackstone, . .	9	277	439	194	160	123	106	-	-	-	1,299
Milford, . .	28	322	326	232	295	129	-	-	-	-	1,304
Millbury, . .	13	419	401	195	103	-	-	-	-	-	1,118
Southbridge, .	7	520	550	361	151	59	-	-	-	-	1,641
Westborough, .	5	152	165	300	260	44	-	-	-	-	921
Totals, . .	624	9,127	10,325	7,943	4,159	1,039	106	-	-	-	32,699
AGGREGATES.											
Cities, . . .	9,074	58,935	36,761	29,635	17,955	9,655	3,297	449	112	19	156,818
Towns, . .	624	9,127	10,325	7,943	4,159	1,039	106	-	-	-	32,699
Totals, . .	9,698	68,062	47,086	37,578	22,114	10,694	3,403	449	112	19	189,517

It will be seen that the persons employed in the 9,698 establishments considered, number about 190,000. The whole number of employés in mechanical and manufacturing industries in the forty cities and towns is given, by the manufacturers, as about 215,000. The whole number for the State, from the same source of information, is about 308,000. Thus, the returns which we give cover 88+ per cent of the persons employed in the towns tabulated, and 70 per cent of all employed in manufactures in the State. The 9,698 establishments form 43+ per cent of those in the State engaged in manufactures. The average number of persons employed in each establishment of the 9,698, is 19+. For the balance of the establishments in the State, the average is only 7+.

The 190,000 employés are at work in stories numbering from the first to the ninth. The figures plainly indicate the distribution by stories, but we present the percentages as being more easily used or remembered.

In first story, .	. 35 + per cent.	In fifth story, .	. 5 + per cent.
In second story,	. 24 + per cent.	In sixth story, and above, .	. 2 + per cent.
In third story, .	. 19 + per cent.		
In fourth story,	. 11 + per cent.		

The percentage employed in the third story or below, is about 80, or, in other words, 152,000 employés out of 190,000 are obliged to descend but two flights of stairs to reach the ground.

Recapitulations II. and III., which follow, are intimately related. The first gives a classification of size of establishments, the size being determined by the number of employés. The second shows the number of persons employed with regard to this size classification.

RECAPITULATION II.—*Persons Employed in each Establishment.*

CITIES AND TOWNS.	NUMBER OF ESTABLISHMENTS EMPLOYING— 5 or less persons.	6 to 20 persons.	21 to 100 persons.	101 to 500 persons.	Over 500 persons.	Whole number of Establishments.
CITIES.						
Fall River, ...	120	62	21	16	22	241
New Bedford, ...	135	80	19	6	2	242
Taunton, ...	67	46	13	5	3	134
Gloucester, ...	67	33	5	–	–	105
Haverhill, ...	190	89	36	2	–	317
Lawrence, ...	137	51	18	2	6	214
Lynn, ...	216	157	109	20	–	502
Newburyport, ...	82	42	9	6	1	140
Salem, ...	294	120	27	4	1	446
Holyoke, ...	–	1	9	13	4	27
Springfield, ...	243	132	54	6	3	438
Cambridge, ...	197	88	44	13	2	344
Lowell, ...	198	103	54	9	9	373
Newton, ...	44	36	10	3	–	93
Somerville, ...	73	26	13	2	1	115
Boston, ...	2,907	1,173	379	52	5	4,516
Chelsea, ...	76	49	13	3	–	141
Fitchburg, ...	95	33	26	4	–	158
Worcester, ...	313	118	81	15	1	528
Totals, ...	5,454	2,439	940	181	60	9,074

RECAPITULATION II.—Concluded.

CITIES AND TOWNS.	NUMBER OF ESTABLISHMENTS EMPLOYING—					Whole number of Establishments.
	5 or less persons.	6 to 20 persons.	21 to 100 persons.	101 to 300 persons.	Over 300 persons.	
TOWNS.						
Adams,	63	29	13	12	2	119
Pittsfield,	102	32	9	5	–	148
Attleborough,	6	15	17	3	–	41
Beverly,	–	9	16	1	–	26
Marblehead,	–	13	14	1	–	28
North Andover,	–	–	3	–	1	4
Chicopee,	–	–	5	1	2	8
Northampton,	–	–	4	3	–	7
Malden,	–	5	3	–	1	9
Marlborough,	–	1	4	11	1	17
Natick,	–	6	7	1	–	14
Stoneham,	–	6	15	4	–	25
Waltham,	–	5	–	1	2	8
Woburn,	–	10	17	2	–	29
Weymouth,	–	16	21	4	–	41
Brockton,	–	6	26	5	1	38
Blackstone,	–	3	3	2	1	9
Milford,	–	10	13	5	–	28
Millbury,	–	–	8	5	–	13
Southbridge,	–	–	2	4	1	7
Westborough,	–	1	1	2	1	5
Totals,	171	167	201	72	13	624
AGGREGATES.						
Cities,	5,454	2,439	940	181	60	9,074
Towns,	171	167	201	72	13	624
Totals,	5,625	2,606	1,141	253	73	9,698

RECAPITULATION III.—*Persons Employed as regards Size of Establishment.*

CITIES AND TOWNS.	EMPLOYED IN ESTABLISHMENTS HAVING—					Whole No. of persons employed.
	5 or less persons.	6 to 20 persons.	21 to 100 persons.	101 to 300 persons.	Over 300 persons.	
CITIES.						
Fall River,	264	673	927	3,139	11,591	16,594
New Bedford,	395	789	744	731	1,983	4,642
Taunton,	171	571	740	836	1,250	3,568
Gloucester,	174	304	193	–	–	671
Haverhill,	483	898	1,395	342	–	3,118
Lawrence,	306	511	888	355	10,012	12,072
Lynn,	526	1,657	4,480	3,642	–	10,305
Newburyport,	222	469	501	1,205	350	2,747
Salem,	749	1,280	949	500	1,335	4,813
Holyoke,	–	16	583	2,363	2,655	5,617
Springfield,	618	1,378	2,228	914	1,529	6,667
Cambridge,	474	949	1,915	2,568	703	6,609
Lowell,	503	1,111	2,193	1,647	10,726	16,180
Newton,	130	377	348	448	–	1,303
Somerville,	184	287	619	341	350	1,781
Boston,	6,943	12,719	16,445	8,437	2,233	46,777
Chelsea,	212	401	532	572	–	1,717
Fitchburg,	246	336	1,188	775	–	2,545
Worcester,	810	1,316	3,770	2,514	682	9,092
Totals,	13,410	26,042	40,638	31,329	45,399	156,818

RECAPITULATION III.—Concluded.

CITIES AND TOWNS.	EMPLOYED IN ESTABLISHMENTS HAVING—					Whole No. of persons employed.
	5 or less persons.	6 to 20 persons.	21 to 100 persons.	101 to 300 persons.	Over 300 persons.	
TOWNS.						
Adams,	168	294	757	2,000	1,045	4,264
Pittsfield,	258	339	307	687	-	1,591
Attleborough,	21	171	690	359	-	1,241
Beverly,	-	101	858	150	-	1,109
Marblehead,	-	176	820	347	-	1,343
North Andover,	-	-	254	-	520	774
Chicopee,	-	-	259	275	2,396	2,930
Northampton,	-	-	304	458	-	762
Malden,	-	72	201	-	539	812
Marlborough,	-	18	255	1,568	490	2,331
Natick,	-	98	461	117	-	676
Stoneham,	-	88	646	570	-	1,304
Waltham,	-	69	-	195	1,754	2,018
Woburn,	-	122	693	302	-	1,117
Weymouth,	-	209	802	542	-	1,553
Brockton,	-	84	1,272	860	375	2,591
Blackstone,	-	48	100	368	783	1,299
Milford,	-	131	485	688	-	1,304
Millbury,	-	-	535	583	-	1,118
Southbridge,	-	-	116	716	809	1,641
Westborough,	-	15	68	316	522	921
Totals,	447	2,035	9,883	11,101	9,233	32,699
AGGREGATES.						
Cities,	13,410	26,042	40,638	31,329	45,399	156,818
Towns,	447	2,035	9,883	11,101	9,233	32,699
Totals,	13,857	28,077	50,521	42,430	54,632	189,517

The town and city details in these tables may be condensed into the following summary in which the tabular basis of classification, 5 and under, 6 to 20, etc., is retained.

5,625 establishments employ 13,857 persons. Average in each, 2 +
2,606 establishments employ 28,077 persons. Average in each, 10 +
1,141 establishments employ 50,521 persons. Average in each, 44 +
253 establishments employ 42,420 persons. Average in each, 167 +
73 establishments employ 54,632 persons. Average in each, 748 +
9,698 establishments employ 189,507 persons. Average (the State), 19 +

Recapitulation IV. shows the height of buildings in which the 190,000 employés are at work.

RECAPITULATION IV.—*Height of Buildings, and Persons Employed.*

CITIES AND TOWNS.	PERSONS EMPLOYED IN BUILDINGS HAVING—									Whole number employed.
	1 story.	2 stories.	3 stories.	4 stories.	5 stories.	6 stories.	7 stories.	8 stories.	9 stories.	
CITIES.										
Fall River, . .	966	847	129	1,455	6,567	6,630	-	-	-	16,594
New Bedford, . .	698	798	874	772	1,500	-	-	-	-	4,642
Taunton, . . .	485	995	826	1,136	126	-	-	-	-	3,568
Gloucester, . .	364	249	58	-	-	-	-	-	-	671
Haverhill, . . .	546	659	713	854	846	-	-	-	-	3,118
Lawrence, . . .	494	599	507	214	1,667	683	5,983	1,975	-	12,072
Lynn, . . .	919	1,700	2,202	2,505	2,729	250	-	-	-	10,305
Newburyport, . .	584	413	454	425	521	350	-	-	-	2,747
Salem, . . .	1,188	959	1,012	98	1,406	150	-	-	-	4,813
Holyoke, . . .	-	189	1,229	1,352	1,565	1,282	-	-	-	5,617
Springfield, . .	2,356	884	952	1,172	246	1,057	-	-	-	6,667
Cambridge, . .	2,379	955	1,046	1,476	743	10	-	-	-	6,609
Lowell, . . .	1,653	1,079	1,422	655	2,761	7,795	815	-	-	16,180
Newton, . . .	530	370	74	329	-	-	-	-	-	1,303
Somerville, . .	1,083	193	826	-	179	-	-	-	-	1,781
Boston, . . .	11,497	8,280	9,141	8,244	5,936	3,528	9	-	142	46,777
Chelsea, . . .	551	497	171	498	-	-	-	-	-	1,717
Fitchburg, . . .	541	910	878	216	-	-	-	-	-	2,545
Worcester, . .	1,319	912	2,164	2,297	2,250	150	-	-	-	9,092
Totals, . .	28,153	21,488	24,178	23,698	28,542	21,835	6,807	1,975	142	156,818
TOWNS.										
Adams, . . .	204	815	1,470	2,105	170	-	-	-	-	4,264
Pittsfield, . . .	368	824	350	420	129	-	-	-	-	1,691
Attleborough, . .	106	496	872	-	177	-	-	-	-	1,241
Beverly, . . .	40	180	617	272	-	-	-	-	-	1,109
Marblehead, . .	-	806	437	600	-	-	-	-	-	1,843
North Andover, .	-	-	-	697	77	-	-	-	-	774
Chicopee, . . .	-	50	395	89	2,396	-	-	-	-	2,930
Northampton, . .	-	468	140	154	-	-	-	-	-	762
Malden, . . .	14	89	70	689	-	-	-	-	-	812
Marlborough, . .	-	18	170	1,378	765	-	-	-	-	2,331
Natick, . . .	-	131	135	410	-	-	-	-	-	676
Stoneham, . . .	25	7	495	777	-	-	-	-	-	1,304
Waltham, . . .	20	49	945	-	1,004	-	-	-	-	2,018
Woburn, . . .	17	159	308	331	302	-	-	-	-	1,117
Weymouth, . .	191	196	446	680	40	-	-	-	-	1,553
Brockton, . . .	-	82	540	1,594	375	-	-	-	-	2,591
Blackstone, . .	-	65	87	414	783	-	-	-	-	1,349
Milford, . . .	8	142	166	408	580	-	-	-	-	1,304
Millbury, . . .	-	100	115	903	-	-	-	-	-	1,118
Southbridge, . .	-	246	133	453	809	-	-	-	-	1,641
Westborough, . .	-	-	203	-	718	-	-	-	-	921
Totals, . .	1,083	3,373	7,544	12,374	8,325	-	-	-	-	32,699
AGGREGATES.										
Cities, . . .	28,153	21,488	24,178	23,698	28,542	21,835	6,807	1,975	142	156,818
Towns, . . .	1,083	3,373	7,544	12,374	8,325	-	-	-	-	32,699
Totals, . .	29,236	24,861	31,722	36,072	36,867	21,835	6,807	1,975	142	189,517

If we compare the results of this recapitulation with those of Recapitulation I., we secure the following statement:—

Employed in one story b'ld'gs, 29,236	Working in first story of all b'ld'gs, 68,062
Employed in two story b'ldg's, 24,861	Working in second story of all b'ld'gs, 47,086
Employed in three story b'ld'gs, 31,722	Working in third story of all b'ld'gs, 37,578
Employed in four story b'ld'gs, 36,072	Working in fourth story of all b'ld'gs, 22,114
Employed in five story b'ld'gs, 36,867	Working in fifth story of all b'ld'gs, 10,694
Employed in six story b'ld'gs, 21,835	Working in sixth story of all b'ld'gs, 3,408

Employed in seven story b'ld'gs,	6,807	Working in seventh story of all b'ld'gs,	449
Employed in eight story b'ld'gs,	1,975	Working in eighth story of all b'ld'gs,	112
Employed in nine story b'ld'gs,	142	Working in ninth story of all b'ld'gs,	19

The above is easily understood when it is remembered that although persons may be employed in five-story buildings, they may perform their labor in the first or second stories of such buildings. The statement plainly shows the concentration of workmen in the lower stories of the buildings in which they are employed.

Recapitulation V. gives in detail the means of escape from the second story and those stories above the second in the forty cities and towns. The average number of persons depending upon each stairway or fire escape as a means of exit, is shown for each story.

RECAPITULATION V.—*Means of Escape. (2d story and above).*

CITIES AND TOWNS.	Persons employed.	MEANS OF ESCAPE.			Average No. of persons to each stairway and fire escape.
		Stairways.	Fire escapes.	Stairways and fire escapes.	
Cities.					
FALL RIVER.					
2d story,	4,349	89	29	118	37
3d story,	2,747	73	34	107	25
4th story,	2,101	59	39	98	21
5th story,	1,915	54	33	87	22
6th story,	775	20	12	32	24
Totals,	11,887	295	147	442	27
NEW BEDFORD.					
2d story,	1,289	107	6	113	11
3d story,	916	29	4	33	28
4th story,	523	6	2	8	65
5th story,	147	1	1	2	73
Totals,	2,875	143	13	156	18
TAUNTON.					
2d story,	1,163	69	6	75	16
3d story,	588	22	6	28	21
4th story,	167	6	4	10	17
5th story,	12	1	1	2	6
Totals,	1,930	98	17	115	17
GLOUCESTER.					
2d story,	189	31	-	31	6
3d story,	22	5	-	5	4
Totals,	211	36	-	36	6
HAVERHILL.					
2d story,	909	138	1	139	7
3d story,	751	79	1	80	9
4th story,	523	29	-	29	18
5th story,	133	6	-	6	22
Totals,	2,316	252	2	254	9

Recapitulation V.—Continued.

CITIES AND TOWNS.	Persons employed.	Means of Escape.			Average No. of persons to each stairway and fire escape.
		Stairways.	Fire escapes.	Stairways and fire escapes.	
Lawrence.					
2d story,	3,377	68	11	79	43
3d story,	2,340	41	9	50	47
4th story,	1,350	17	9	26	52
5th story,	458	10	6	16	29
6th story,	468	8	4	12	39
7th story,	336	7	3	10	34
8th story,	92	1	1	2	46
Totals,	8,421	152	43	195	43
Lynn.					
2d story,	2,576	244	-	244	11
3d story,	2,682	160	-	160	17
4th story,	1,663	62	-	62	27
5th story,	1,029	24	-	24	43
6th story,	139	1	-	1	139
Totals,	8,089	491	-	491	16
Newburyport.					
2d story,	741	46	5	51	15
3d story,	640	25	4	29	22
4th story,	222	5	4	9	25
5th story,	82	3	3	6	14
6th story,	34	1	1	2	17
Totals,	1,719	80	17	97	18
Salem.					
2d story,	1,251	165	4	169	7
3d story,	738	64	2	66	11
4th story,	212	10	2	12	18
5th story,	170	3	1	4	42
6th story,	18	1	1	2	9
Totals,	2,389	243	10	253	9
Holyoke.					
2d story,	1,581	26	21	47	34
3d story,	1,350	22	19	41	33
4th story,	865	16	13	29	30
5th story,	319	9	6	15	21
6th story,	113	1	1	2	56
Totals,	4,228	74	60	134	32
Springfield.					
2d story,	1,281	131	4	135	10
3d story,	1,122	74	4	78	14
4th story,	604	26	5	31	19
5th story,	201	7	1	8	25
6th story,	153	5	1	6	25
Totals,	3,361	243	15	258	13
Cambridge.					
2d story,	1,489	110	6	116	13
3d story,	796	49	5	54	15
4th story,	570	25	4	29	20
5th story,	99	4	1	5	20
6th story,	10	1	1	2	5
Totals,	2,964	189	17	206	14

RECAPITULATION V.—Continued.

CITIES AND TOWNS.	Persons employed.	MEANS OF ESCAPE.			Average No. of persons to each stairway and fire escape.
		Stairways.	Fire escapes.	Stairways and fire escapes.	
LOWELL.					
2d story,	4,085	160	18	178	23
3d story,	3,216	80	15	95	34
4th story,	1,454	26	13	39	37
5th story,	1,263	11	11	22	57
6th story,	503	7	6	13	39
7th story,	100	2	2	4	22
Totals,	10,621	286	65	351	30
NEWTON.					
2d story,	250	16	3	19	13
3d story,	87	6	1	7	12
4th story,	78	4	2	6	13
Totals,	415	26	6	32	13
SOMERVILLE.					
2d story,	228	28	1	29	8
3d story,	104	7	1	8	13
4th story,	40	1	1	2	20
5th story,	19	1	–	1	19
Totals,	391	37	3	40	10
BOSTON.					
2d story,	8,922	1,244	34	1,278	7
3d story,	8,949	834	34	868	10
4th story,	6,446	515	18	533	12
5th story,	3,356	186	14	200	16
6th story,	1,084	50	7	57	19
7th story,	18	3	–	3	4
8th story,	20	1	–	1	20
9th story,	19	1	–	1	19
Totals,	28,809	2,834	107	2,941	10
CHELSEA.					
2d story,	342	53	1	54	6
3d story,	217	16	1	17	13
4th story,	49	5	1	6	8
Totals,	608	74	3	77	8
FITCHBURG.					
2d story,	707	60	3	63	11
3d story,	325	34	3	37	9
4th story,	42	4	2	6	7
Totals,	1,074	98	8	106	10
WORCESTER.					
2d story,	2,032	204	8	212	10
3d story,	2,045	183	9	192	11
4th story,	1,046	72	6	78	13
5th story,	452	22	2	24	19
Totals,	5,575	481	25	506	11

Recapitulation V.—Continued.

CITIES AND TOWNS.	Persons employed.	MEANS OF ESCAPE.			Average No. of persons to each stairway and fire escape.
		Stairways.	Fire escapes.	Stairways and fire escapes.	
Towns.					
Adams.					
2d story, ...	1,654	67	7	74	22
3d story, ...	800	39	8	47	17
4th story, ...	370	13	5	18	21
5th story, ...	3	1	1	2	1
Totals, ...	2,827	120	21	141	20
Pittsfield.					
2d story, ...	523	49	5	54	10
3d story, ...	241	21	6	27	9
4th story, ...	87	4	2	6	14
5th story, ...	4	1	-	1	4
Totals, ...	855	75	13	88	10
Attleborough.					
2d story, ...	471	24	4	28	17
3d story, ...	245	11	3	14	17
4th story, ...	46	2	2	4	11
5th story, ...	39	2	2	4	10
Totals, ...	801	39	11	50	16
Beverly.					
2d story, ...	415	24	-	24	17
3d story, ...	409	16	-	16	26
4th story, ...	90	3	-	3	30
Totals, ...	914	43	-	43	21
Marblehead.					
2d story, ...	454	23	-	23	20
3d story, ...	528	17	-	17	31
4th story, ...	287	7	-	7	41
Totals, ...	1,269	47	-	47	27
North Andover.					
2d story, ...	227	4	4	8	28
3d story, ...	179	5	5	10	18
4th story, ...	107	4	4	8	13
5th story, ...	5	1	1	2	2
Totals, ...	518	14	14	28	19
Chicopee.					
2d story, ...	926	19	6	25	37
3d story, ...	594	16	5	21	28
4th story, ...	341	10	4	14	24
5th story, ...	314	8	2	10	31
Totals, ...	2,175	53	17	70	31
Northampton.					
2d story, ...	346	8	3	11	31
3d story, ...	57	4	1	5	11
4th story, ...	23	3	1	4	6
Totals, ...	426	15	5	20	21

RECAPITULATION V.—Continued.

CITIES AND TOWNS.	Persons employed.	MEANS OF ESCAPE.			Average No. of persons to each stairway and fire escape.
		Stairways.	Fire escapes.	Stairways and fire escapes.	
MALDEN.					
2d story,	182	10	2	12	15
3d story,	374	7	2	9	42
4th story,	31	4	1	5	6
Totals,	587	21	5	26	23
MARLBOROUGH.					
2d story,	728	24	1	25	29
3d story,	779	21	-	21	37
4th story,	344	17	1	18	19
5th story,	96	3	-	3	32
Totals,	1,947	65	2	67	29
NATICK.					
2d story,	227	12	-	12	19
3d story,	191	10	1	11	17
4th story,	97	6	-	6	16
Totals,	515	28	1	29	18
STONEHAM.					
2d story,	306	25	-	25	12
3d story,	453	12	-	12	38
4th story,	305	12	-	12	25
Totals,	1,064	49	-	49	22
WALTHAM.					
2d story,	679	17	1	18	38
3d story,	285	6	2	8	36
4th story,	123	2	1	3	41
5th story,	23	2	2	4	6
Totals,	1,110	27	6	33	34
WOBURN.					
2d story,	372	34	2	36	10
3d story,	369	27	1	28	13
4th story,	41	12	-	12	3
5th story,	30	3	-	3	10
Totals,	812	76	3	79	10
WEYMOUTH.					
2d story,	496	40	1	41	12
3d story,	360	29	1	30	12
4th story,	261	13	-	13	20
5th story,	10	1	-	1	10
Totals,	1,127	83	2	85	13
BROCKTON.					
2d story,	438	42	1	43	10
3d story,	797	37	1	38	21
4th story,	637	22	1	23	28
5th story,	160	1	-	1	160
Totals,	2,032	102	3	105	19

RECAPITULATION V.—Concluded.

CITIES AND TOWNS.	Persons employed.	MEANS OF ESCAPE.			Average No. of persons to each stairway and fire escape.
		Stairways.	Fire escapes.	Stairways and fire escapes.	
BLACKSTONE.					
2d story, ...	439	8	3	11	40
3d story, ...	194	6	3	9	21
4th story, ...	160	4	3	7	23
5th story, ...	123	1	1	2	61
6th story, ...	106	1	1	2	53
Totals, ...	1,022	20	11	31	33
MILFORD.					
2d story, ...	326	33	1	34	10
3d story, ...	232	26	3	29	8
4th story, ...	295	16	-	16	18
5th story, ...	129	5	-	5	26
Totals, ...	982	80	4	84	12
MILLBURY.					
2d story, ...	401	14	11	25	16
3d story, ...	195	13	11	24	8
4th story, ...	103	11	7	18	6
Totals, ...	699	38	29	67	10
SOUTHBRIDGE.					
2d story, ...	550	9	5	14	39
3d story, ...	361	5	3	8	45
4th story, ...	151	3	3	6	25
5th story, ...	59	1	1	2	29
Totals, ...	1,121	18	12	30	37
WESTBOROUGH.					
2d story, ...	165	5	-	5	33
3d story, ...	300	5	-	5	60
4th story, ...	260	2	-	2	130
5th story, ...	44	2	-	2	22
Totals, ...	769	14	-	14	55

This table gives an easily understood showing of the stories in which persons are employed, and their means of escape in case of fire or panic. The averages of persons to each means of escape have a comparative value, for each city and town has been dealt with in the same manner. It is impossible for us to fix an arbitrary figure which shall denote the proper number of stairways or fire escapes for a given number of employés. We give the facts as they are. Thorough inspection of each establishment, and full knowledge of the subject, will be required before it can be definitely and truthfully stated that the condition shown is a very bad, bad, fair, good or very good one, all things considered. Certain salient points are, however, plainly noticeable. The fourth and fifth stories in New Bedford are manifestly overcrowded. The sixth stories in Lynn and Holyoke; the fifth in Lowell and Brockton; the fifth and sixth in Blackstone, and the fourth in Westborough, seem to be in a similar condition. The average to each stairway and fire escape in Lawrence seems large, but it should be borne in mind that there is a great difference in fire escapes, some being far more serviceable than others. The number of fire escapes in Fall River is proportionately large. The proportion is less in Lawrence, and large again in Holyoke. In North Andover each stairway is matched with a fire escape. This would seem to be the theoretically correct state of affairs, for, in case of fire or panic, if the stairs become impassable, the fire escapes are the only means left and should be capable of furnishing a chance of exit for all. It will be noticed that Lynn has no fire escapes, although large numbers of workmen are employed in the upper stories. The general condition of Boston, Millbury and Worcester seems remarkably good. Deductions from and remarks upon these city and town showings could be greatly extended, but it seems unnecessary. To secure the safety of the employés in any manufacturing establishment, as regards means of escape in case of fire or panic, such establishment must be taken by itself and the problem solved for it. Uniform requirements will not suit in dissimilar cases, and the true value of laws looking to the end considered, would be found in their intelligent and practical adaptation and execution rather than in any enforced conformity to an arbitrary, but doubtless theoretically correct standard; and, while a law should be so framed as to point out the theoretically correct standard, discretionary power should be given to those charged with the execution of the law by which they would be enabled to consider the specific requirements of each establishment.

We present next a summary for the State, showing the whole number of stairways and fire escapes by stories, and the average number to each means of escape in the cities, in the towns and in both combined.

Means of Escape, by Stories; for the State.

STORIES.	STAIRWAYS.			FIRE ESCAPES.			AVG. NO. OF PERSONS TO EACH STAIRWAY AND FIRE ESCAPE.		
	Cities.	Towns.	Cities and Towns.	Cities.	Towns.	Cities and Towns.	Cities.	Towns.	Cities and Towns.
Second, . .	2,989	491	3,480	161	57	218	12	19	13
Third, . .	1,803	333	2,136	152	56	208	15	20	16
Fourth, . .	888	170	1,058	125	35	160	18	20	18
Fifth, . .	342	32	374	80	10	90	23	25	22
Sixth, . .	95	1	96	34	1	35	25	53	26
Seventh, .	12	-	12	5	-	5	26	-	26
Eighth, . .	2	-	2	1	-	1	37	-	37
Ninth, . .	1	-	1	-	-	-	19	-	19
Totals, .	6,132	1,027	7,159	558	159	717	14	20	15

A comparison of this table with the city and town presentations will show what cities and towns are above or below the State average. In the cities we find one fire escape to about ten stairways; in the towns one fire escape to about six stairways, and in both cities and towns one fire escape to about ten stairways. It will be seen that the number of persons to each means of escape grows larger from story to story as we go up higher, which is just what should *not* be the case. This is undoubtedly owing to the fact that in all kinds of business the heavy machines requiring few attendants are put in the lower stories, while the light and small machines with the greatest number of employés are in the upper stories. This state of affairs, with our present knowledge of building, is a necessity, and can only be palliated, for a radical change is impossible.

DOORS.

A tabulation of the returns of the 9,698 establishments in the previously mentioned 19 cities and 21 towns, as regards the opening of outside doors discloses the fact that the great majority swing inwardly. Those opening outwardly number but 175; those sliding, 78; those having either outwardly opening or sliding doors, in part, number 146. By this latter statement, we mean that in the case of the 146, some of their outside doors also swing inwardly. The balance reporting state that the outside doors swing inwardly. There can be no valid reason for doubting the existence of this state of affairs, or for not considering that in case of fire or panic serious consequences are likely to follow. With recent disasters so fresh in the public mind, there would seem to be need of no more investigation or argument to cause the passage of laws which will secure a desirable uniformity in the manner of the opening of doors toward the outside. In this case, at least, an arbitrary law is the kind needed to secure one well recognized and easily attainable condition of safety.

HEIGHT OF BUILDINGS; ATTICS, BASEMENTS, ETC.

From a tabulation of the same city and town returns that have furnished the basis for all that has preceded, we derive the following exhibit:—

Height of Buildings used as Manufactories; Attics, Basements, Etc.

STORIES.	Number of Buildings.	With Attics.	With Basements.	With both Attics and Basements.
One Story Buildings.				
In cities, ...	1,340	1	9	1
In towns, ...	267	-	6	1
Totals, ...	1,607	1	15	2
One and a half Story Buildings.				
In cities, ...	62	-	-	-
In towns, ...	23	-	1	-
Totals, ...	85	-	1	-
Two Story Buildings.				
In cities, ...	1,042	22	39	3
In towns, ...	383	10	16	4
Totals, ...	1,425	32	55	7
Two and a half Story Buildings.				
In cities, ...	73	2	3	-
In towns, ...	19	-	1	-
Totals, ...	92	2	4	-
Three Story Buildings.				
In cities, ...	749	34	63	4
In towns, ...	243	23	28	7
Totals, ...	992	57	91	11
Three and a half Story Buildings.				
In cities, ...	25	-	-	-
In towns, ...	5	-	-	-
Totals, ...	30	-	-	-
Four Story Buildings.				
In cities, ...	658	21	108	12
In towns, ...	163	19	23	17
Totals, ...	821	40	131	29

Height of Buildings, Etc.—Concluded.

STORIES.	Number of Buildings.	With Attics.	With Basements.	With both Attics and Basements.
Four and a half Story Buildings.				
In cities,	12	-	-	-
In towns,	3	-	-	-
Totals,	15	-	-	-
Five Story Buildings.				
In cities,	389	15	105	8
In towns,	39	2	5	12
Totals,	'428	17	110	20
Six Story Buildings.				
In cities,	97	4	10	3
In towns,	2	-	-	-
Totals,	99	4	10	3
Seven Story Buildings.				
In cities,	14	1	2	-
In towns,	2	-	-	-
Totals,	16	1	2	-
Eight Story Buildings.				
In cities,	2	1	1	-
In towns,	-	-	-	-
Totals,	2	1	1	-
Nine Story Buildings.				
In cities,	1	-	-	-
In towns,	-	-	-	-
Totals,	1	-	-	-

These 5,613 buildings contained the 9,698 establishments, and the 190,000 employés. In the large cities, especially, several firms occupy the same building. We find that but 2.7 per cent of the buildings have attics; 7.4 per cent have basements, and a trifle over 1 per cent both attics and basements.

In view of the facts presented herewith in regard to the stories in which persons are employed, and their means of escape in case of fire or other danger, and in view also of past investigations made by this Bureau in relation to manufacturing establishments, we feel more than ever the necessity of enacting laws which shall provide for securely guarding the belting and exposed shafting, gearing and drums in manufactories; which shall prohibit the cleaning of machinery while in motion; which shall provide that elevators shall be made thoroughly safe, and that all such establishments shall be well supplied with stairways and fire escapes, and with doors swinging outwardly; which shall require ample apparatus for extinguishing fires in each building, and that all male employés shall be organized into fire parties and trained in its use; which shall prohibit the constant employment of persons in attic rooms; which shall require that all rooms and their appurtenances shall be well ventilated and kept clean; and, finally, that ample provision shall be made for carrying into effect the provisions of such laws by establishing sufficient penalties to prevent their evasion or violation, and by the appointment of proper executive officers.

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PUBLIC DOCUMENT...... ......No. 32.

REPORT OF THE COMMISSION

TO INQUIRE INTO THE

EXPEDIENCY OF REVISING THE JUDICIAL SYSTEM OF THE STATE.

UNDER RESOLVE, CHAPTER 43, 1876.

DECEMBER, 1876.

BOSTON:
ALBERT J. WRIGHT, PRINTER,
79 MILK STREET (CORNER OF FEDERAL).
1877.

Commonwealth of Massachusetts.

To His Excellency **Alexander H. Rice**, *Governor of the Commonwealth of Massachusetts.*

The Commissioners appointed under chapter forty-three of the Resolves of the year one thousand eight hundred and seventy-six, respectfully submit the following Report:—

Resolve authorizing the appointment of a Commission to inquire into the expediency of revising the Judicial System of the State.

Resolved, That the governor and council be and they are hereby authorized to appoint a commission, consisting of three suitable persons learned in the law, to sit during the recess of the legislature, with authority to call witnesses, to inquire into the expediency of revising the judicial system of the state with a view to securing greater economy, efficiency and promptness in the administration of justice, especially by justices of the peace, trial justices, and police, district and municipal courts. Said commission shall submit its report in writing, with bill or bills if practicable, to the Secretary of the Commonwealth, on or before the twentieth day of December next, on which day the commission shall expire. The secretary of the Commonwealth shall cause the report to be printed as a document of the public series, to be laid before the next general court, and a sufficient number of copies to be printed to allow the secretary to transmit one to each member of the present legislature, in addition to the distribution of such documents now prescribed by law.—*Approved April 26, 1876.*

The foregoing Resolve is a recognition by the Legislature of the fact, long known to those who are familiar with the courts, that the administration of the law, both in the civil and the criminal branches, is unnecessarily expensive. It contains, further, a suggestion of a lack of promptness and efficiency.

The duty is assigned to this Commission to inquire into the expediency of revising the judicial system of the State, with a view to remedy any existing evils in the matter of economy, promptness, and efficiency in the administration of justice, especially in what are ordinarily called the inferior courts.

The court of justice being the means of settling controversies affecting persons and property, which civilization has substituted for brute force, the measure of civilization to which a State has attained may not unfairly be tested by the simplicity, comprehensiveness and efficiency of the machinery by which it does this work. The question of economy is of secondary importance only, the first thing needful being to maintain the best system; and the question of expense being worthy of consideration only so far as to ascertain the minimum of cost which can be reached without detracting from the character of the institutions.

As at present arranged, the expenses of the highest two courts, except the salaries of the judges which are paid by the Commonwealth, are met by the several counties, each county paying the costs which arise within its territory.

There would be nothing gained by attempting to diminish the salaries of these judges. They are now far below the annual income of many practising lawyers in the large cities, and even in the country. And while it is true that the honor of being called to preside in these dignified tribunals may be regarded as a compensation for some loss of income, it should be remembered that in this State, where it is almost universally true that each man is the creator of his own fortune, men of culture and vigor and learning ought not to be expected to forego the opportunity to acquire the means of elegant ease, for honors which bring with them exhausting labor and a bare support. There can be no greater extravagance in the body politic than a cheap judiciary. Judicial work ill done, must be done over again, doubling the cost to county and suitor alike, and shaking the respect of all concerned for the institutions of government.

The chief cost of these courts is not in the salaries of judges. The fees of jurors are the most important item, and these, it is plain, are large in proportion as causes which ought not to be brought before them consume their time, and as actions which have been erroneously tried come back to be tried again.

In the inferior courts, the chief expense to the public is in the salaries of judges and clerks. There is no uniformity in the manner in which these are paid. In some instances the State pays them, and in others the counties in which the courts have jurisdiction.

In those parts of the State where no permanent inferior court is established, the expenses of civil business are paid by the parties; of criminal business, by the counties, which get such recompense as may be from the fines and costs collected from the criminals.

It is a noticeable fact that no provision of law exists for auditing the accounts of clerks of municipal, district or police courts, but they are left to pay over to the treasurers of their counties such sums as they see fit, without supervision from any quarter.

It is believed that if the several counties are required to pay the costs of maintaining the district and police courts established within their respective limits, there will be comparatively little danger that these courts will multiply faster than they are needed.

The Commission does not understand that the Resolve contemplates or authorizes any inquiry looking toward substantial changes in the forms of pleading, or the method of trying causes. The Constitution secures to all parties the right of trial by jury in suits at law between persons, and provides that the Legislature shall not make any law that shall subject any person to a capital or infamous punishment—except for the government of the army or navy—without trial by jury. So long as this continues to be the fundamental law of the State, there must necessarily be a system of pleading, producing substantially the results produced by the existing system, and it is questionable whether any important advantages would result from the establishment of a new system, which would be a change merely in form.

So, too, under the Constitution, it would be vain to attempt the creation of new courts operating on and governed by new principles or methods, because either party must have the right to the decision of a jury, if he sees fit to demand it.

There is, nevertheless, a wide-spread and growing opinion that trial by jury, in a large proportion of civil cases at least, is a clumsy and unsatisfactory process for settling the rights of parties. Juries are, in most instances, made up of men unaccustomed to listen to protracted discussions, untrained in sifting evidence, likely to be influenced by extraneous incidents and appeals to prejudice. Complicated and delicate questions under contracts are often passed upon by juries wholly ignorant of business customs, and incapable of understanding their relation to the questions under consideration, while in actions of tort it is well understood that a jury trial is desired by the party which has the best opportunity to play upon the prejudices and enlist the sympathies of the tribunal which is sworn to decide according to the law and the evidence, but unwittingly gives a verdict which is not supported by either.

The rapid increase of the number of cases tried by the court without a jury, under the recent legislation which requires the party wishing a jury trial to demand it, is conclusive evidence of the want of faith, on the part of the members of the bar, in the value of the jury as a tribunal for deciding questions of fact.

It is an important consideration, further, that the jury is in many circumstances an obstacle to the prompt arrival at results. It must be unanimous. A failure to agree causes a continuance of the action to another term, and a repetition of the expense of trial, till, not infrequently, the accumulated costs of the suit become of more importance than the amount originally in controversy. Beyond this lies the further fact that the cost to the counties of trial by jury in the higher courts, where two juries with supernumeraries are kept in attendance, is something more than one hundred dollars for each day of the term; and it often happens that the sum of all the verdicts rendered would not suffice to pay the fees of the jurors.

While, therefore, it is impossible to take away the right of parties, under the Constitution, to trial by jury, it is important that the courts be so constituted that litigants may obtain, in the largest number of cases practicable, satisfactory decisions, without resorting to the jury.

At present the docket of the Superior Court is encumbered by numerous actions involving, respectively, amounts far within the jurisdiction of police courts and district courts, and not a few involving amounts within the jurisdiction of justices of the peace. Many of these actions were begun in the Superior Court, while a part of them have come there by appeal from courts of inferior jurisdiction. Many of them—indeed, so far as the Commission is informed, most of them—are simple actions for the collection of debts, carried into the higher court either for the mere purpose of putting off the day of judgment, or to try, on appeal, a question of amount only, paltry in itself, and involving in its settlement by this means, inordinate expense to the parties, and to the counties as well. This evil arises, in part, from the facility of appeal, and in part from the character of the courts appealed from.

This Commission has endeavored to investigate with thoroughness into the workings of district and police courts, where already established, and into the expediency of extending the system of district courts throughout the Commonwealth, or abolishing the existing courts of that kind.

To the end that full information might be obtained, on which to reach a conclusion, printed circulars were sent to all parts of the State, and to all persons who were supposed to be able to furnish information, asking for suggestions, and public hearings were held, after extensive advertisement, at Boston, Worcester, Springfield, Taunton, and Lawrence. These hearings were attended by members of the bar, judges of district and police courts, clerks of courts, and others; and full and free discussions of the subject-matter of the Resolve were had. Numerous communications were submitted by persons unable to attend the hearings, and have received the careful attention of the Commission. In addition to this, examination was made of divers plans heretofore proposed to the Legislature from time to time.

Upon consideration of the matter, with such aid as could be obtained from the sources above indicated, the Commission is of opinion that no uniform system of courts of inferior jurisdiction can wisely be adopted for the whole State. In the thickly settled commercial and manufacturing parts of the Commonwealth, grows up a great amount of civil business of a character almost unknown in the sparsely inhabited farming regions, and some of the regions near the sea. In the same parts of the State a class of population gathers which calls for the punishment of crime to an extent fortunately unknown in the rural districts. So that, while it is necessary in the cities and large towns to have a court in session daily to try criminals, and once or twice a week to try civil causes, there are extensive sections of the State in which a court is needed but rarely, for either purpose. The Commission is satisfied, that, while the establishment of police courts in the cities, and of district courts in those other parts of the State where there is such an amount of business within the jurisdiction of those courts as to render them nearly self-sustaining and of real importance to the community for the suppression of crime and for the settlement of differences between individuals, is wise, it is equally well satisfied that to establish such courts in thinly settled, non-commercial and non-manufacturing districts, would be to create offices at large cost to the counties in which the courts were established, to the inconvenience rather than the convenience of the people, and to the profit only of the persons appointed to be judges and clerks of such courts. Each case as it arises should be left to the good judgment of the Legislature to create or refuse a court, as the evidence should show that it was or was not needed for the protection and accommodation of the proposed district, as indicated by the amount of civil and criminal business arising therein. While the county of Essex, with its numerous cities and large towns, might need several police or district courts, the county of Barnstable, with a small population of a different character, scattered over an extensive territory, would not require one.

The only municipal courts in the State are established in the city of Boston. They are eight in number, and during the last three or four years, laws have been enacted modifying or declaring the extent of the civil or criminal jurisdiction of some one or all of them. The Commission was satisfied, by evidence brought to its attention, that this system of eight courts for the city of Boston is cumbersome, expensive, and inconvenient to the public. It recommends, therefore, that all these courts, except the Municipal Court of the city of

Boston, be abolished; that the number of justices of the court be five, with one special justice, as now provided, to act in the absence or inability of any of the standing justices.

The civil business within the jurisdiction of the court can be done at one place with greater convenience, on the whole, to parties, witnesses and attorneys, than if distributed, as now, among eight different courts, and requiring the attendance of the same attorney, perhaps, at all.

In individual instances, no doubt, some inconveniences will arise to parties from the necessity of going to the central court-house, instead of having the court within stone's throw of their place of business; but this inconvenience is fully met by the fact that most of the attorneys practising in the courts have their offices near the central court-house, must be seen and consulted there, and can be taken away to the outlying courts only at greatly increased cost to the client; and by the additional consideration that the cost of maintaining the outlying courts for the sake of the small amount of civil business done in them, is a costly extravagance indulged in for a small gratification.

For doing the criminal business of Boston, there should be four daily sessions of the court: one at the court-house in Court Square, for the cases arising in the old city proper, in Charlestown and in East Boston; one at South Boston, for the cases arising there and in Dorchester; one at Roxbury or West Roxbury, for the cases arising there; and one at Brighton, on account of its isolated position, for cases arising there.

The justice sitting for criminal cases at the central court-house would be busily engaged throughout the day. The justice sitting at South Boston would have enough to do to occupy the greater part of the day. The justices sitting at Roxbury and at Brighton would have very short sessions, The justice trying civil cases would be in court most of the time. The special justice would supply the place of any justice who should be ill or temporarily absent. And in case of special emergency, one justice could hold court both at Roxbury and Brighton.

The present clerical force at the central court-house will be able to do the clerk-work there, but three additional assistant clerks will be needed to attend to the business at the three other places of holding the court.

By a judicious assignment of the several justices to hold court at the several places from time to time, they will, in turn, be relieved from continuous labor, and no one of them need be overworked.

The criminal business done at the central court, under the proposed arrangement, will not be so great as was done there before the court at South Boston was established, and, as has been stated, the amount done at the other three sessions will be by no means burdensome to the presiding justices.

It is supposed that opposition will arise to the abolition of the courts now existing. But it should be remembered, that the existing system of courts in the city is not the result of a well-defined plan made for the city as it is now bounded, but is a piece of patchwork, resulting from the fact that the city has grown to its present size by the annexation of adjacent cities and towns, in some of which police or district courts were already established, while in others municipal courts have been created without careful consideration of the relation existing between the wants of the districts and the cost of the institution.

The adoption of the reçommendation as to the courts of Boston, will result, after providing suitable salaries for the justices and clerks, in an annual saving in expense to the public of more than twelve thousand dollars in salaries alone.

Under the present system, there are ten justices, whose aggregate salaries amount to twenty-one thousand nine hundred dollars. It is proposed to substitute for them five justices, with salaries amounting together to fifteen thousand dollars.

There are now fifteen clerks and assistant clerks, with salaries amounting, in the aggregate, to twenty-three thousand two hundred dollars. The plan recommended substitutes for them ten clerks and assistant clerks, whose salaries amount together to eighteen thousand dollars.

To the saving thus made should be added the reduction in expense effected by reducing the number of places of holding court from eight to four.

The Commission recommends that every police court, and every district court, have a clerk, and that his salary and that of the judge be paid by the county in which the court is established. The jurisdiction of the two classes of courts should be uniform, extending in civil matters to three hundred dollars; and the judges of the several courts in each county should be required to reside in the district for which their courts are established, and to meet at stated intervals, to establish and revise rules of court which should be as nearly uniform as practicable for all the courts in the county. Each court should have certain times and places of sitting, to be fixed by law. The clerks should receive complaints and issue warrants in criminal matters as justices of the peace, in order that the judges may try the cases without having formed even a shadowy opinion on the merits in the preliminary investigation as to the propriety of issuing the warrant.

There should be no jury trials in police courts or district courts. Clerks should be appointed by the governor and council, for the term of five years. The receiving of complaints and issuing warrants thereon being acts of a judicial character, are hardly proper under the Constitution to be done by clerks, as such, to the exclusion of the judges, and it is for this reason that the Commission recommends that those acts be done by the clerks under their commissions as justices of the peace.

While the Commission advocates the maintenance of police courts or district courts, whenever the amount and character of business render such courts desirable, in view of the benefit to the district on the one hand, and of the cost of maintaining them on the other, it is of opinion that experience shows that several existing courts ought to be abolished. These are courts the returns of which, as given in the table accompanying this Report, indicate a comparatively insignificant amount of business, which may safely be left to the care of justices of the peace especially designated to try causes, thus saving to the county the expense of salaries and of the incidents to a court; or their districts can be added to the district of another court. They are the District Court of Southern Berkshire, the Police Court of Williamstown, the District Court of Eastern Hampden, the District Court of Northern Middlesex, the District Court of Central Middlesex, the Third and Fourth District Courts of Plymouth County, the First and Second District Courts of Eastern Worcester, and the Second District Court of Southern Worcester.

The Police Court of Chicopee should also be abolished, because its business can be done by the Police Court of Springfield without increasing the cost of that court to the county, and, as the distance from Chicopee to Springfield is so small, without serious inconvenience to parties or witnesses.

The Commission is aware that there is, among lawyers, a decided aversion to justices of the peace as a tribunal for the trial of civil causes. And this aversion is not without reason. While there are many justices abundantly competent, intellectually and morally, to decide cases of the magnitude which is within the jurisdiction of district courts, there are others who have no qualifications for such duty. The Commission has been informed of instances in which such incompetent magistrates, without any legal attainments, with little education of any kind, are in the habit of trying cases which are brought before them, not because the plaintiff's attorney believes that they will administer justice, but because, as witnesses expressed it, "they are owned" by the attorney. The result, of course, is numerous appeals to the Superior Court, and, worse than that, a travesty on justice, tending to a debasement of morals, and a contempt of the institution for administering the law.

The office of justice of the peace has ceased to be an honor to the holder. It is bestowed without much discrimination on every man who asks for it, and does not appear to have been convicted of crime, with more reference, it would seem, to the revenue derived from the commissions, than to the fitness of the purchaser to perform the duties of the office. This has arisen in part, no doubt, from the fact that the office has been shorn of a portion of its power, by the law creating trial justices of criminal cases, and to the belief that in most cases it is used merely for administering oaths and taking acknowledgments of deeds. However this may be, it is manifestly unwise, as a matter of public economy, no less than it is unjust to the people individually, that men appointed to the office, in absolute disregard of their unfitness to exercise judicial powers, should have authority to pass judgment, as a court, upon the rights and obligations of persons, or as magistrates, to receive complaints and issue warrants on criminal charges against individuals.

The evils resulting from the indiscriminate manner in which justices of the peace have been appointed are not confined to the exercise of their civil powers. It too often happens that warrants are issued on frivolous complaints, and from a failure on the part of the justice to understand his duty in the premises; and unscrupulous justices have been known to issue warrants under circumstances which compel the inference that the inducement to do so lay in the fee received by them as attorneys for the prosecution at the trial, rather than in the desire to exercise judiciously the power of a magistrate to secure the punishment of an offender.

In order to prevent the recurrence of such abuses as are above referred to, the Commission recommends that the governor and council be authorized to designate and commission a suitable number of justices of the peace in the several counties to try civil cases, with jurisdiction to the same extent, in amount and character of actions and proceedings, which district courts have, and to receive complaints and issue warrants in criminal cases, returnable before trial justices, district courts or police courts, in the county, according to the jurisdiction in the several cases as they arise; and recommends that after the passage of an Act for this purpose, no justice of the peace theretofore commissioned and not so designated, have authority to try civil cases or to receive complaints or issue warrants in criminal cases, and that all justices of the peace thereafter commissioned, have authority to try civil causes and to receive complaints and issue warrants, the whole number having such authority being limited by law.

Justices of the peace with such powers, in limited numbers, carefully selected and residing in the sections of the State where their services will be most needed, will furnish to the sparsely settled portions of the State respectable and competent magistrates, free from bias and likely to give satisfaction in their official acts to all parties whose business comes before them, except in peculiar cases, involving difficult questions, proper to be carried to the higher courts for final decision.

Authority should be given to district courts, police courts and justices of the peace, to issue commissions, to take depositions of witnesses without the State, to be used in the trial of civil cases pending before them.

With such provision made by means of police and district courts, and justices of the peace, for the trial of small causes, the Commission further recommends that plaintiffs who bring actions originally in the Superior Court, and fail to recover damages to the amount of three hundred dollars, shall recover no costs, unless the judge before whom the action is tried certifies that the title to real estate was actually involved, substantially as is now provided when damages to a less amount than twenty dollars are recovered in an action originally brought in the Superior Court; and further recommends that no appeal in civil cases from a district court, police court, or a justice of the peace, be allowed till the appellant files with the clerk a bond to the opposing party in a reasonable sum, with sureties approved by the court or clerk or the justice of the peace, for the prosecution of the appeal and payment of all damages and costs which the obligee in the bond may recover in the suit. And that it be provided by law that if the plaintiff in an action of contract or tort appeals from a police or district court, or from a justice of the peace, and fails to recover as damages, more than he recovered as damages in the court appealed from, with interest thereon, he shall recover no costs after the appeal, and shall suffer judgment for the defendant for double costs in the Superior Court. And that if a defendant in an action of contract or tort appeals from a police or district court, or justice of the peace, and fails to obtain a reversal of the judgment appealed from or to reduce the damages recovered against him, he shall recover no costs after the appeal, and shall suffer judgment against him for double costs in the Superior Court.

It is believed that with courts of the character indicated, and provisions of law such as these, the number of small causes in the Superior Court will be greatly diminished, much expense to the counties avoided, and substantial and satisfactory justice done to individuals.

In order that no inconvenience may arise, as the existing commissions of justices of the peace expire, from the scarcity of officers to administer oaths and take acknowledgments of deeds, the Commission recommends that the governor, with the advice of the council, be authorized to appoint suitable persons to be commissioners of deeds, with authority to administer oaths, take depositions, acknowledgments, and proof of deeds and other instruments, and issue subpœnas to witnesses in all the counties of the Commonwealth; such officers to be commissioned for seven years, and to pay a fee of five dollars for their commissions, as is now provided in regard to notaries-public and other officers.

As trial justices of criminal cases are justices of the peace specially designated to try criminal cases, as the law now stands, for the term of three years, it frequently happens that their commissions as justices of the peace expire before the three years for which they are so designated have run out. The Commission recommends that trial justices hold their commissions, as such, during the unexpired term for which they are commissioned as justices of the peace, so that no complication or irregularity may arise by reason of the chief commission expiring before the subordinate one.

The Commission further recommends that the jurisdiction of trial justices of juvenile offenders be transferred to the police and district courts and trial justices, with a discretion to try the juveniles at the ordinary sessions of court, or otherwise.

The result of inquiry in all parts of the State is that nothing is gained to the public nor to the accused by the establishment of the special tribunal for juveniles, and that the office of visiting agent, so far as it relates thereto, is a source of unnecessary expense, not compensated by any beneficial results. This expense is not merely in the salary and travelling expenses of the agent, but also in the continuances of cases, rendered necessary in order to ensure his attendance, as is now required by law, before they can be finally disposed of, and often results in unjust and harmful detention of young persons while waiting for trial.

The Commission further recommends that appeals from and exceptions to decisions and rulings of a single justice of the Superior Court, at *nisi prius* be to a general term of that court, instead of to the Supreme Judicial Court, as is now provided. It is well known that, with the increase of population and the growth of business in the Commonwealth, the work devolving upon the justices of the Supreme Judicial Court is steadily and rapidly increasing. A large part of this work consists in hearing, deciding and writing opinions upon questions raised on rulings of the Superior Court. All these decisions and opinions are reported. Students of the reports are aware that, in very many cases, the rulings appealed from or excepted to, are on points which have been already fully covered by reported decisions of the Supreme Judicial Court. It involves no disrespect to the justices of the Superior Court to say that sometimes their rulings in such cases are in opposition to the law, as held by the court of last resort. It is not to be expected that any judge can have the whole body of the law so fully and readily at command as to be able, in all instances, in the hurry of a jury trial, to decide aright all the questions raised by astute counsel, after careful preparation. But it may well be expected, and is beyond question true, that the justices of the Superior Court, sitting in banc, would decide a very large proportion of the questions argued before them to the entire satisfaction of both parties, thus rendering it unnecessary to take the opinion of the Supreme Judicial Court, except in cases of novel impression, or raising questions of such nicety that neither party would be content with an adverse decision, except from the highest tribunal in the State.

It is not intended that the decision of the Superior Court, at general term, should prevent any party from carrying the question to the Supreme Judicial Court; but it should be provided that any party appealing to the Supreme Judicial Court should pay the costs of such appeal, unless the decision were reversed.

It is believed that the relief to the Superior Court from the adoption of the recommendations herein before contained, relating to the jurisdiction of the inferior courts and appeals therefrom, will be so great that no more labor will be put upon the judges, in consequence of the establishment of general terms, than they now are obliged to undergo; while it is evident that the proposed change will add a new dignity and importance to the tribunal.

The Commission further recommends that all petitions for juries, which may now be made to county commissioners, should be made to the Superior Court, either in term time or vacation, and that, if made in vacation, the clerk should be authorized to issue orders of notice, returnable to the court at the next term thereof to be held in the county for civil business.

The experience of all members of the bar, whose testimony on the subject has been heard, is that the sheriff's jury is an unsafe and unsatisfactory tribunal, especially when presided over by an officer without legal training, and incompetent to rule intelligently on the questions which arise during the trial. And it is equally well understood that the board of county commissioners, as ordinarily constituted, has no peculiar fitness for deciding the legal questions which frequently are raised for their consideration, as to the right of petitioners to have the jury asked for. If the petitions are made to the Superior Court, the expense and delay of many petitions for the writ of *certiorari* will be avoided.

The Commission further recommend that the Superior Court, sitting with three justices, have exclusive jurisdiction to try capital cases, with a right of exception in the defendant to the Supreme Judicial Court. As the Superior Court already has jurisdiction of all lesser offences, and sits for many months every year in the trial of indictments, its judges are necessarily more familiar with the criminal law than are the judges of the Supreme Judicial Court, who try no criminal cases, except capital ones. There is no cause, therefore, to apprehend that those charged with the capital offence will have a less fair or less intelligent trial than they would get in the higher court. Indeed, they would have one advantage under the proposed plan, which they have not now, in that any exceptions which they might take to the rulings of the court would be heard and decided by a court no members of which had already expressed an opinion on the questions in issue. Such trials should not be at the regular terms for criminal business, but at special terms to be appointed therefor.

The Commission further recommends that the Superior Court have exclusive original jurisdiction of all actions of tort for injuries to the person, in which damages are claimed in a larger amount than three hundred dollars, and that the right to remove actions of tort to the Supreme Judicial Court be abolished.

There is no reason why this class of actions should not be as fairly and as wisely tried in the Superior Court as in the Supreme Judicial Court. The removal to the Supreme Judicial Court is sought by defendants, in most instances, for the sake of delay, because the jury terms of the Supreme Court are less frequent than those of the Superior Court, and the removal often results in a postponement of the trial for a year. The legal principles involved in this class of cases are simple and well established.

The Commission further recommends that original writs and writs of *scire facias* be returnable to the Superior Court and the Supreme Judicial Court on the first Tuesday of every month, and that in all cases when the defendants are residents of the State, the clerk be authorized to enter a default at the end of ten days after the day of entry, unless an appearance has been entered for the defendant, and that the clerk have authority to enter judgment as of the day of default, and to issue execution thereon, in all defaulted cases brought to recover liquidated damages. In cases when the defendant is without the State, the clerk should have authority to issue orders of notice returnable at the next term of the court for civil business.

The provisions here recommended are substantially like those contained in Stat. 1851, chap. 233, and it is believed that if enacted they will have a beneficial effect in bringing many actions, in which there is no controversy, to an end during vacation, and without a continuance from term to term of court.

The Commission further recommends that the law permitting either party in a suit for divorce to demand and have a trial by jury, be repealed.

The reasons for this recommendation need not be here stated at length, after what has already been said in relation to the value of juries in ordinary cases, especially in view of the peculiar and delicate nature of questions of divorce, which are to be decided by the court after careful consideration, often of conflicting testimony and circumstantial evidence, requiring to be weighed and sifted with judicial patience and discrimination. A divorce granted or refused by a court, by reason of the verdict of a jury which decides questions of fact, in opposition to the opinion reached by the presiding judge, would probably do injustice to the losing party. Moreover, the proceedings for divorce are not common-law proceedings, and the question at issue addresses itself to the conscience of the court, in view of all the facts and surrounding circumstances, in a peculiar manner rendering the interposition of a jury incongruous and inappropriate.

The Commission further recommends that the statute giving to the Supreme Judicial Court full equity jurisdiction in all cases, according to the usage and practice of courts of equity, except when there is a plain, adequate, and complete remedy at law, be so amended that the jurisdiction of the court in this direction be fixed, and not liable to contraction by implication in consequence of the passage of statutes giving new powers or jurisdiction to courts of law. It is well known that the existing statute is construed by the Supreme Judicial Court to except all cases from its equity jurisdiction in which there is a remedy at law at the time of filing the bill. With this construction, it is evident that the equity jurisdiction is liable to be constantly narrowed by the enactment of laws making no express reference to the matter. It is believed that it would be wiser that the equity jurisdiction should be fixed at the limits which it had when the Statute of 1857, chap. 214, went into operation.

The Commission further recommends that registers of probate and insolvency be authorized to perform certain clerical and ministerial duties, which the existing law requires the judges of the court to do.

The Commission further recommends that when the wages for the personal labor and services of a defendant are attached, and when a debt due for the services of the wife or minor children of a defendant are attached, there shall be reserved in the hands of the trustee a sum not exceeding one hundred dollars, which shall be exempt from such attachment.

Under the existing law, the exemption is to the amount of twenty dollars, except in actions to recover for necessaries furnished the debtor or his family, when no part of the wages is exempt from attachment.

The Commission is of opinion that it is not for the advantage of the laborer or mechanic, nor of the parties with whom he deals, that his wages should be exposed to attachment. It would be better for both that the dealings between them should be for cash. The trader would make many less bad debts, and the laborer would buy at less prices, when not obliged to pay an insurance premium upon his credit. He would be better able to pay his way, and live comfortably, if not obliged to expend a part of his earnings for costs of trustee suits. Single law offices are known to issue a thousand trustee writs in a year, chiefly to attach wages. The costs paid on these average at least five dollars a suit. Now, when it is remembered that this practice is going on in all the towns and cities where laborers and mechanics are employed, it is plain that the amount of money taken annually from the earnings of this class of people into the pockets of lawyers and sheriffs' officers is enormous, reaching, without doubt, to hundreds of thousands of dollars. The bare statement of this fact would seem to justify the change in the law which is recommended.

The Commission is of opinion that costs accruing in actions begun by trustee process, in which no effective foreign attachment is made, ought not to be allowed against the principal defendants. And a section, supplementary to the present law, has been drawn, and is submitted herewith, which is intended to remedy any mischief which may now exist in this matter. There seems to be no reason why costs should be permitted to accumulate as a debt against a debtor unable to meet his obligations, merely because his creditor has made a fruitless attempt to attach property where no attachable property existed.

The Commission recommends that the matters cognizable by the Supreme Judicial Court for the county of Dukes County, shall be heard at the terms of that court held in the county of Bristol, it having been shown to the Commission that the change will be to the convenience of suitors in the courts of Dukes County.

The Commission is aware that some of its recommendations touch upon matters of apparently trivial importance, while others contemplate changes in the law which may seem somewhat violent and extreme. It is believed, however, that when the recommendations are considered as a whole, it will be found that, if adopted, they will give to the State a symmetrical judicial system, under which all parties can obtain with promptness an impartial interpretation of the laws and administration of justice, with a due regard to the economic interests of the State, and with ample protection for every right of every citizen.

While the main object sought by the Commission has been to increase the efficiency of the courts, it finds satisfaction in the consideration that its recommendations, if adopted, will result in a decided diminution of the cost to the public, as well as to suitors, of administering the law.

With this Report are submitted eight bills, embodying the recommendations herein contained.

A. L. SOULE.
F. W. HURD.
C. W. CLIFFORD.

DECEMBER 20, 1876.

AN ACT

CONCERNING JUSTICES OF THE PEACE, TRIAL JUSTICES, AND COMMISSIONERS OF DEEDS.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECTION 1. The governor, with the advice and consent of the council, shall designate and commission a suitable number of the justices of the peace, holding commissions when this act takes effect, in the several counties, to try civil cases, receive complaints, and issue warrants; and the justices of the peace so designated and commissioned shall continue to have and exercise, within their respective counties, all the powers, authority, and jurisdiction in civil cases, and in receiving complaints, and issuing warrants, that justices of the peace now have; and no justice of the peace, commissioned before this act takes effect, not designated and commissioned in accordance with this section, shall hereafter have or exercise any power, authority, or jurisdiction to try civil cases, or receive complaints, or issue warrants.

SECT. 2. The justices of the peace designated and commissioned in accordance with section one of this act, shall be distributed as the convenience of the several counties requires, and the number in commission shall not at any one time exceed: in Barnstable, nine; Berkshire, eighteen; Bristol, thirteen; Dukes County, two; Essex, twenty; Franklin, twelve; Hampden, twelve; Hampshire, ten; Middlesex, forty; Nantucket, two; Norfolk, eight; Plymouth, fifteen; Suffolk, seven; Worcester, forty-five: *provided, however*, that nothing in this act shall prevent the designating or commissioning of any justice of the peace who shall also be a clerk, or assistant clerk, of any municipal, district, or police court.

SECT. 3. The aggregate number of justices of the peace commissioned after this act takes effect, and of justices of the peace designated and commissioned under section one of this act, having jurisdiction to try civil cases, receive complaints, and issue warrants, shall not at any one time in any county exceed the number limited by section two of this act, subject to the proviso therein made.

SECT. 4. If any justice of the peace designated under section one of this act, or any justice of the peace commissioned after this act takes effect, shall change his domicil, his authority to try civil cases, receive complaints, and issue warrants, shall thereupon cease, and another justice of the peace may be designated or commissioned in his place.

SECT. 5. The justices of the peace commissioned after this act takes effect, and the justices of the peace designated under section one of this act, shall have original and concurrent jurisdiction with the superior court of all actions of contract, tort, or replevin, where the debt or damages demanded, or value of the property alleged to be detained, is more than twenty, and does not exceed three hundred dollars.

SECT. 6. No appeal from the judgment of a justice of the peace, in any civil action or proceeding, shall be allowed, unless the appellant, within twenty-four hours after the entry of judgment, shall file a bond to the adverse party with sufficient surety or sureties, to be approved by the adverse party, or by the justice entering the judgment, in a reasonable sum, to be fixed by the justice aforesaid, or approved by the adverse party, with condition to enter and prosecute his appeal with effect, and to satisfy any judgment which may be entered against him in the superior court for debt, damages, or costs, within thirty days after the entry of such judgment: *provided*, that the justice aforesaid may, for cause shown, extend the time for filing such bond. In determining the sufficiency of the sureties upon said bond, the said justice may examine upon oath, to be administered by him, the persons offered as sureties, and all other witnesses produced by either party as to .the sufficiency of said bond.

SECT. 7. In all actions before a justice of the peace, the defendant or trustee shall be entitled to enter his appearance at any time during the whole of the return day, and the place for making such entry shall be distinctly stated in the writ and summons.

SECT. 8. All warrants in criminal cases, issued by any person qualified to issue warrants under the provisions of this act, shall be made returnable before some trial justice, police, district, or municipal court, having jurisdiction of the examination of the person charged with the offence. So much of section thirty-two of chapter one hundred and twenty, and so much of section seventeen of chapter one hundred and sixteen of the General Statutes as provides that no fees shall be allowed to the justice issuing warrants against persons charged with criminal offences, is hereby repealed.

SECT. 9. Any justice of the peace having jurisdiction to try civil cases, shall have the same authority to issue commissions to take depositions in cases pending before him, that the superior court now has in cases pending in that court.

SECT. 10. Trial justices shall have and exercise, within their respective counties, all the powers, authority, and jurisdiction that trial justices of juvenile offenders now have; and hereafter no trial justice of juvenile offenders, not being a trial justice or judge of a police, district, or municipal court, or a judge of probate and insolvency, shall have or exercise any power, authority, or jurisdiction whatever, and section one of chapter three hundred and fifty-eight of the acts of the year eighteen hundred and seventy-two, is hereby repealed.

SECT. 11. Every trial justice hereafter designated and commissioned, shall hold his office until the end of the term for which he is commissioned as justice of the peace. And all acts, or parts of acts, so far as they prescribe a different tenure of said office, are hereby repealed.

SECT. 12. So much of section one of chapter one hundred nine of the acts of the year eighteen hundred and sixty-two as requires of justices of the peace and trial justices that, before the delivery of their commissions, they shall pay into the department of the secretary of the Commonwealth the sum of five dollars, is hereby repealed; but the provisions of said section shall apply to the commissioners of deeds hereinafter created.

SECT. 13. The governor, with the advice and consent of the council, shall appoint a suitable number of persons to be commissioners of deeds, who shall hold their office for the term of seven years.

SECT. 14. Commissioners of deeds shall have the same power, authority, and jurisdiction that justices of the peace now have in the following cases:—

First, in administering oaths and affirmations;

Second, in taking acknowledgments and proof of deeds and other instruments;

Third, in taking depositions;

Fourth, in issuing subpœnas to witnesses;

And shall be entitled to the fees therefor now provided by law, and shall be subject in the matters above named to the same restrictions and penalties to which justices of the peace are now subject.

SECT. 15. Nothing in this act contained shall affect any case or proceeding pending when it takes effect, but such cases or proceedings may be completed as if this act had not been passed; and nothing in this act contained shall be held to affect the jurisdiction of any police, district, or municipal court.

SECT. 16. This act shall take effect for all purposes on the first day of July, in the year eighteen hundred and seventy-seven; but the governor shall have power, by and with the advice and consent of the council, to designate and commission the justices of the peace as provided in section one, at any time after its passage.

SECT. 17. All provisions of existing laws, inconsistent with the provisions of this act, are hereby repealed.

AN ACT

CONCERNING DISTRICT AND POLICE COURTS.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECTION 1. The governor, by and with the advice and consent of the council shall appoint a clerk of the first district court of Southern Worcester, who shall receive an annual salary of five hundred dollars; a clerk of the third district court of Southern Worcester, who shall receive an annual salary of seven hundred dollars; a clerk of the police court of Holyoke, who shall receive an annual salary of eight hundred dollars; a clerk of the police court of Lee, who shall receive an annual salary of five hundred dollars; and a clerk of the police court of Gloucester, who shall receive an annual salary of eight hundred dollars. The clerks above named shall faithfully perform all services required by law of the clerks of district or police courts in this Commonwealth, and shall each give bond with sureties in the sum of five thousand dollars for the faithful performance of his duties.

SECT. 2. All clerks of district and police courts who are now by law required to be appointed by the governor or elected by the people, shall hereafter be appointed by the governor, with the advice and consent of the council, and all clerks of district and police courts shall hold their offices for the term of five years and no longer: *provided, however*, that the present clerks of district and police courts shall hold their several offices for the term for which they have been commissioned, except those whose terms are not limited to a certain number of years, and such clerks shall hold their offices for the term of five years from and after this act takes effect and no longer.

SECT. 3. No person shall hereafter be appointed a clerk of a district or police court unless at the time of his appointment he shall hold a commission as justice of the peace, with authority to receive complaints and issue warrants.

SECT. 4. The salaries of all judges and clerks of district and police courts, and all the expenses of said courts, shall hereafter be paid by the several counties in which they are established, and no fees shall be received by said judges or clerks to their own use for any services rendered by them in any capacity in receiving complaints or issuing warrants, subpœnas, mittimuses, or other processes, or as trial justices of juvenile offenders, but all such fees shall be paid over once in three months by said judge or clerk to the county in which such court is established: *provided*, that nothing herein contained shall be construed as requiring the payment to the county of any moneys which are payable under existing laws to cities or towns.

SECT. 5. The accounts of every clerk of a district or police court shall at least once in every three months be examined and audited by the judge of said court, and an exact detailed statement of the receipts and expenditures of said clerk during said three months, with the certificate of said judge of the result of said examination, shall be immediately transmitted to the county treasurer, who shall forthwith settle with said clerk by paying or collecting the balance due from or to the county, as the case may be.

SECT. 6. The several district and police courts of the Commonwealth shall hereafter, within the territory over which they have jurisdiction, have original and concurrent jurisdiction with the superior court of all actions of contract, tort or replevin, where the debt or damages demanded or value of the property alleged to be detained is more than twenty and does not exceed three hundred dollars.

SECT. 7. No appeal from a judgment of a district or police court in any civil action or proceeding, except such as may be commenced under chapter one hundred thirty-seven of the General Statutes, shall be allowed unless the appellant within twenty-four hours after the entry of judgment shall file a bond to the adverse party with sufficient surety or sureties to be approved by the adverse party or by the judge or clerk of the court rendering the judgment, in a reasonable sum to be fixed by the judge or clerk aforesaid, or approved by the adverse party, with condition to enter and prosecute his appeal with effect and to satisfy any judgment which may be entered against him in the superior court upon said appeal for debt, damages or costs within thirty days of the entry of such judgment: *provided*, that the judge aforesaid may for cause shown extend the time for filing said bond. In determining the sufficiency of the sureties upon said bond, the said judge or clerk may examine upon oath, to be administered by either of them, the persons offered as sureties and all other witnesses produced by either party, as to the sufficiency of said bond.

SECT. 8. The judges of the several district and police courts shall have and exercise within the districts under the jurisdiction thereof all the power, authority, and jurisdiction that trial justices of juvenile offenders now have.

SECT. 9. Section seven of chapter three hundred and fifty-nine of the acts of the year eighteen hundred and seventy is hereby amended by striking out of the last clause of said section the words "the notice provided in section eight shall be given to the visiting agent, and"; section eight of said chapter is hereby repealed, and section ten of said chapter is hereby amended by striking out of the second and third lines of said section the words "upon request of such agent"; and all provisions of existing laws requiring notice to the visiting agent of the pendency of a complaint against a boy or girl under the age of seventeen years, or requiring his presence at the hearing of such complaint, is hereby repealed.

SECT. 10. No person shall be hereafter appointed a judge of a district or police court who is not a resident of the district over which the court to which he is appointed has jurisdiction of criminal cases.

SECT. 11. District and police courts shall have the same authority to issue commissions to take depositions in cases pending therein that the superior court now has in cases pending in that court.

SECT. 12. The judges of the several district and police courts in each county where more than one court is established shall meet as often as once in each year and make and adopt rules for their several courts, which shall be as nearly uniform as possible. Such rules shall provide for an entry day of writs as often as once a week; that the defendant and trustee shall be entitled to enter their appearance at any time during the whole of the return day, and for fixed times and places for holding the sessions of said courts, subject to the existing provisions of law applicable thereto. In any county where only one such court is established, the judge of said court shall make the necessary rules for said court, and said rules shall provide as aforesaid. Said rules shall be made and adopted in each county within thirty days after this act takes effect.

SECT. 13. Sections two, three, four and seven of this act shall apply to assistant clerks of district and police courts, and section four shall apply to the special justices of said courts when acting in the place of the judge thereof: *provided*, that the compensation to the special justices of any court for services rendered in any one year, in excess of eight per centum of the annual salary of the standing justices of such court, shall be deducted by the county treasurer from the salary of such standing justice.

SECT. 14. Nothing in this act contained shall be held to affect any case now pending, and all laws or parts of laws, so far as they are inconsistent with the provisions of this act, are hereby repealed.

SECT. 15. This act shall take effect for the purpose of commissioning the clerks of district and police courts provided for by section one, upon its passage, and so far as relates to the salaries of judges and clerks of district and police courts, upon the first day of July in the year eighteen hundred seventy-seven.

AN ACT

CONCERNING THE MUNICIPAL COURT OF THE CITY OF BOSTON.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECTION 1. The number of justices of the municipal court of the city of Boston shall be five instead of three, as now provided by law.

SECT. 2. The said municipal court of the city of Boston, and the justices thereof, shall have the same power and jurisdiction throughout the city of Boston as they have within the district and territory now embraced within their jurisdiction, in all matters relating to crimes and offences, and in receiving complaints and issuing warrants, and in all civil actions and proceedings.

SECT. 3. All cases pending at the time this act shall take full effect, whether civil or criminal, in the municipal court of the Highland District, in the municipal court of the Dorchester District, in the municipal court of the Charlestown District, in the municipal court of the West Roxbury District, in the municipal court of the Brighton District, in the municipal court of the South Boston District, and in the municipal court of the East Boston District, shall be transferred to and have day in the proper day and term of the municipal court of the city of Boston; and all writs, processes, complaints, petitions and proceedings whatever, which are made returnable or to be entered in said courts for said districts, shall be returnable to, entered, and have day in the proper day and term of said municipal court of the city of Boston; and all judicial writs and processes, and copies founded upon the records of said courts for said districts, shall issue under the seal of said municipal court of the city of Boston, in like manner, and to the same effect, as the same might have issued from said courts for said districts if this act had not been passed; and all writs and processes may be made returnable to the several days and terms of said courts for said districts now established by law till this act shall take full effect, and then all such writs and processes shall be returnable to the days and terms of said municipal court of the city of Boston.

SECT. 4. The records of the said courts for said districts shall, after this act takes full effect, be and remain in the custody of the clerks of the municipal court of the city of Boston.

SECT. 5. The clerk of the municipal court of the city of Boston for criminal business may, in addition to the assistant clerks now provided by law, appoint, in the manner now provided by law respecting the first and second assistant clerks of said court for criminal business, three assistant clerks who shall be styled third assistant clerks, and shall receive an annual salary of twelve hundred dollars each, to be paid in the same manner as now provided by law for the first and second assistant clerks of said court for criminal business. Said third assistant clerks shall have the same powers and duties, and shall be qualified and give bond in the same manner, as is now provided by law for the first and second assistant clerks of said court for criminal business.

SECT. 6. Said municipal court of the city of Boston shall hold four daily sessions for criminal business, except on Sundays or legal holidays, at nine o'clock in the forenoon, at such places within said city as may be designated and provided by the board of mayor and aldermen of the city of Boston.

SECT. 7. All laws establishing the municipal court of the Highland District, the municipal court of the Dorchester District, the municipal court of the Charlestown District, the municipal court of the West Roxbury District, the municipal court of the Brighton District, the municipal court of the South Boston District, and the municipal court of the East Boston District, or giving jurisdiction to said courts or to the justices thereof, except so far as may be necessary that the same should be supported for the purposes of this act, and all acts and parts of acts inconsistent with the provisions of this act are hereby repealed from the day this act shall take full effect; and if upon said day any term of said district courts herein before mentioned in this section shall be in session, or shall have been adjourned to a future day, the remainder of said term may be held by a justice of the municipal court of the city of Boston.

SECT. 8. No person shall hereafter be appointed a clerk or assistant clerk of the municipal court of the city of Boston for criminal business, unless at the time of his appointment he shall hold a commission as justice of the peace with authority to receive complaints and issue warrants; and all fees for receiving complaints and issuing warrants shall be paid to the city of Boston.

SECT. 9. The salaries of the justices of said municipal court of the city of Boston shall be paid by the city of Boston.

SECT. 10. The accounts of the clerks of said court shall, at least once in three months, be examined and audited by one of the justices of said court, and an exact detailed statement of the receipts and expenditures of said clerks during said three months, with a certificate of said judge of the result of said examination, shall be immediately transmitted to the treasurer of the city of Boston, who shall forthwith settle with said clerks by paying or collecting the balance due from or to the city of Boston, as the case may be.

SECT. 11. Section one of chapter three hundred and fifteen of the acts of the year eighteen hundred and seventy-one is hereby amended by striking out all of said section after the words "adverse party," and adding thereto the words following: "with condition to enter and prosecute his appeal with effect, and to satisfy any judgment which may be entered against him in the superior court upon said appeal for debt, damages or costs within thirty days of the entry of such judgment, provided, that any judge of said court may for cause shown extend the time for filing such bond."

SECT. 12. So far as this act provides for appointing, commissioning, and qualifying additional justices of the municipal court of the city of Boston, it shall take effect upon its passage, and it shall take full effect on the first day of July next.

AN ACT

CONCERNING THE SUPERIOR COURT.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECTION 1. General terms of the superior court shall be held by three justices to be designated by the chief justice, for hearing and determining all exceptions, reports, and appeals in matters of law arising in any civil action or proceeding before a single justice.

SECT. 2. Questions of law, whether arising upon a trial or other proceeding, or upon a motion for a new trial, on account of an opinion, direction, order or refusal of a single justice of the superior court in matter of law, may be carried to the general term of said court upon exceptions and appeals, which shall be taken, filed and allowed, and shall be entered, heard and determined in conformity with the provisions of law now applicable to exceptions and appeals in matters of law from the superior court to the supreme judicial court, and the justices of the superior court shall make and promulgate such general rules as may be found necessary to give effect to all the provisions of this act.

SECT. 3. No exceptions to the rulings of nor appeal from the decision of a single justice of the superior court to the supreme judicial court shall be taken in any civil action or proceeding. When exceptions are sustained by the general term of the superior court, the cause shall stand for a new trial, except as hereinafter provided. A party aggrieved by the determination of the general term of the superior court sustaining exceptions whereby his right in law to maintain his action or defence is concluded, or overruling exceptions, or sustaining a judgment appealed from, may, within seven days after the filing of the rescript with the clerk, appeal therefrom to the supreme judicial court, and thereupon copies and papers relating thereto shall be transmitted to and entered on the law docket of the supreme judicial court for the proper county, as soon as may be; and in cases of exceptions or appeals, if the judgment or ruling of the single justice of the superior court, affirmed by the general term of the superior court, is also affirmed by the supreme judicial court, the party prevailing on the exceptions or appeal shall recover double costs from the time the same were alleged or taken before the single justice; and in all cases, if the judgment or ruling of the general term of the superior court is affirmed by the supreme judicial court, the party prevailing on the appeal thereto shall recover double costs from the time of the decision of the general term, unless in either case the supreme judicial court shall otherwise order. In all other cases, the party prevailing on the appeal to the supreme judicial court shall recover the costs of such appeal.

SECT. 4. Copies of papers relating to questions of law arising by appeal or exceptions or report under the provisions of this act, shall be entered on the docket of the general term of the superior court, at terms herein provided for, but the entry thereof shall not transfer the case, but only the question to be determined.

SECT. 5. Section eleven of chapter one hundred and fifteen of the General Statutes shall not apply to exceptions alleged and disallowed in the superior court and the truth of any exceptions alleged and disallowed in the superior court, may be established at the general term of said court, in conformity with the provisions of said section.

SECT. 6. The general term of the superior court shall, as soon as may be after the decision of the questions submitted to it, make any direction, judgment, or decree, or take any such other order in the case as the single justice of said court ought to have done, or as may be necessary or proper for the further disposition of the case, and shall cause a rescript containing a brief statement of the reasons of the decision, to be filed therein, a copy of which rescript shall be forthwith transmitted by the clerk to an attorney of record of each party: *provided, however*, that no execution shall issue upon a final judgment so entered until after the expiration of seven days from the entry thereof.

SECT. 7. Questions of law arising in any civil action or proceeding in the superior court may, by consent of parties, be reported before verdict for the determination of the general term of said court, and a party aggrieved by the determination of the general term on such report may appeal to the supreme judicial court.

SECT. 8. For entering and hearing questions of law arising in the superior court, general terms of said court shall be held as follows:—

For the counties of Berkshire, Franklin, Hampshire, and Hampden, at Springfield, on the first Monday of July.

For the county of Worcester, at Worcester, on the second Monday of July.

For the counties of Plymouth, Bristol, Barnstable, Nantucket, and Dukes, at Taunton, on the first Monday of September.

For the county of Essex, at Salem, on the third Monday of September.

For the counties of Norfolk and Middlesex, at Boston, on the fourth Monday of November.

For the county of Suffolk, at Boston, on the fourth Monday of January and the first Monday of July.

SECT. 9. All exceptions, appeals, and reports pending in the supreme judicial court at the time this act takes effect and not already under advisement by the court, which, under the provisions of this act, would be heard before the general term of the superior court, shall be transferred to the law docket of the general term of the superior court, to be heard and determined under the provisions of this act.

SECT. 10. Three justices of the superior court present at a special term shall have exclusive jurisdiction of trials of indictments for capital crimes, and such trials shall be conducted in the same manner, and subject to the existing provisions of law, so far as they may be applicable, for like cases in the supreme judicial court; and in all respects the proceedings, and the rights of the party accused, and the powers and duties of the court and the justices and clerks thereof, shall be the same as now provided by law respecting trials for capital crimes in the supreme judicial court.

SECT. 11. Three justices of the superior court shall hold a special term in any county in which an indictment for a capital offence is pending, for the trial thereof, at such time and place as they may direct by an order in writing under their hands, addressed to the sheriff of the county.

SECT. 12. The sheriff shall give notice of the intended special term in the manner provided in section twenty-two of chapter one hundred and twelve of the General Statutes; and the clerk for the county shall issue venires for jurors, and he and all other officers shall do all things necessary or proper in relation to such term, as at a stated term.

SECT. 13. A person indicted for a capital offence may be arraigned before the superior court held by one justice, and if he pleads guilty, such court may award sentence against him according to law; and if the prisoner in such case does not plead guilty, the court may assign him counsel, and take all other measures preparatory to a trial to be had before three of the justices.

SECT. 14. Nothing contained in this act shall apply to or affect trials of indictments for capital crimes pending in the supreme judicial court at the time this act takes effect, and all such indictments shall proceed to final judgment as though this act had not been passed.

SECT. 15. The superior court shall have exclusive original jurisdiction of all actions of tort wherein the damages alleged exceed three hundred dollars, brought in whole or in part to recover damages sustained directly or indirectly for injuries to the person of the plaintiff or his servant.

SECT. 16. In personal actions brought originally in the superior court, except actions of replevin where the property demanded exceeds in value three hundred dollars, and except as provided in chapter thirty-six of the acts of eighteen hundred and sixty-two, if the plaintiff finally recovers a sum not exceeding three hundred dollars for debt or damages, he shall be entitled to no costs: *provided, however*, if the plaintiff's claim as established on the trial exceeds three hundred dollars, and is reduced to that amount or less, or overbalanced, by set-offs which could not have been proved in payment, it shall be considered for the purposes of this section as having exceeded three hundred dollars, and the party who finally recovers judgment in the suit when such set-off is proved shall be entitled to his full costs.

SECT. 17. In civil actions commenced before a justice of the peace, police, district, or municipal court, if the plaintiff appeals from a judgment in his favor and does not recover in the court above a greater sum for debt or damages than he recovered by the judgment appealed from, including interest thereon, he shall recover no costs, and the defendant shall recover double costs incurred after the appeal. And if the plaintiff appeals from a judgment in favor of the defendant, and does not recover in the court above any sum for debt or damages, he shall recover no costs, and the defendant shall recover double costs incurred after the appeal.

Sect. 18. In civil actions commenced before a justice of the peace, police, district, or municipal court, if the defendant appeals and the plaintiff recovers in the court above as debt or damages a sum equal to the amount recovered as debt or damages by the judgment appealed from, with interest thereon, the plaintiff shall recover double costs incurred after the appeal.

Sect. 19. In civil actions commenced before a justice of the peace, police, district, or municipal court, where an issue was tried upon a set-off, if either party appeals, the appellee shall recover double costs incurred after the appeal, unless the judgment for debt or damages of the appellate court is more favorable to the appellant than the judgment for debt or damages appealed from.

Sect. 20. In all cases in which it is provided by law that a sheriff's jury may be had for any purpose, application for a jury shall hereafter be made by petition to the superior court in conformity with the provisions of chapter two hundred and sixty-one of the acts of the year eighteen hundred and seventy-three, and trials before a sheriff's jury are hereby abolished: *provided, however*, that any such proceeding pending at the time this act takes effect may be completed as though this act had not been passed.

Sect. 21. The attorney-general shall appear for the Commonwealth in all prosecutions for crimes punishable with death.

Sect. 22. All acts and parts of acts inconsistent herewith are hereby repealed.

Sect. 23. This act shall take effect on the thirtieth day of June next.

AN ACT

CONCERNING THE SUPREME JUDICIAL COURT.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

Section 1. The supreme judicial court shall have full equity jurisdiction according to the usage and practice of courts of chancery, in all cases where there was not a full, adequate and complete remedy at common law at the time of the passage of chapter two hundred and fourteen of the acts of eighteen hundred and fifty-seven, but nothing herein contained shall be construed to take away any equity jurisdiction which said court now has.

SECT. 2. Section fifteen of chapter one hundred and seven of the General Statutes is hereby repealed.

SECT. 3. The terms of court for the county of Dukes County, by existing laws required to be held at Barnstable on the first Tuesday of May, shall hereafter be held at New Bedford on the second Tuesday of November; and all matters arising or pending in the county of Dukes County, cognizable by the supreme judicial court, and to be heard before a single justice, shall be entered, heard, tried and determined at the court held at New Bedford for the county of Bristol, in all respects as if the same court were held in the county of Dukes County. And all matters for the county of Dukes County required to be heard before a law term of the supreme judicial court shall be heard and determined at the law term held for the county of Bristol instead of at the law term of the court for the Commonwealth.

AN ACT

CONCERNING PRACTICE IN THE SUPREME JUDICIAL AND SUPERIOR COURTS.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECTION 1. All original writs, and writs of *scire facias*, returnable into the supreme judicial court, or superior court, in each county, whether such court be then in session or not, shall be made returnable on the first Tuesday of every month; and all such writs shall hereafter be made returnable on these return days instead of the return days now fixed by law, which are no longer to be return days of such writs.

SECT. 2. Original writs, and writs of *scire facias*, which are required to be served fourteen days before the return day, shall be returnable on the return day first occurring next after the expiration of fourteen days from the date of the writ, or, if they be required to be served thirty days before the return day, they shall be made returnable on the return day first occurring next after the expiration of thirty days from the date of the writ.

SECT. 3. For entering original writs and writs of *scire facias*, defaults for want of an appearance, and judgments on such defaults, and for issuing executions, the said courts shall be always open in each county, except on holidays established by law.

SECT. 4. If a defendant duly served with process fails to enter his appearance in writing, within ten days after the return day, his default shall be recorded and judgment and execution rendered accordingly.

SECT. 5. Any judge of the supreme judicial or superior courts, in term time or vacation, may extend the time for entering an appearance, or take off a default for want of an appearance.

SECT. 6. Orders of notice required by section six of chapter one hundred and twenty-six of the General Statutes may be issued by clerks of said courts.

SECT. 7. This act shall take effect on the thirtieth day of June next.

AN ACT

CONCERNING TRUSTEE PROCESS.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECTION 1. When the wages for the personal labor and services of the defendant or a debt due for the services of the wife or minor children of the defendant are attached, there shall be reserved in the hands of the trustee a sum not exceeding one hundred dollars, which shall be exempt from such attachment.

SECT. 2. Section twenty-nine of chapter one hundred forty-two of the General Statutes is hereby repealed.

SECT. 3. In any suit where the wages for the personal labor and services of the defendant or a debt due for the services of the wife or minor children of the defendant, are sought to be attached by trustee process, no costs shall in any event be taxed for the plaintiff against the defendant unless the plaintiff shall satisfy the court entering the judgment that the trustee at the time of the service of the writ was indebted to the defendant in a sum exceeding one hundred dollars: *provided*, that nothing in this section contained shall affect costs in cases where goods, effects or credits other than such wages are effectively attached.

SECT. 4. Nothing in this act contained shall apply to any suit begun before this act takes effect.

AN ACT

CONCERNING REGISTERS OF PROBATE AND INSOLVENCY.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECTION 1. Registers of probate and insolvency in their several counties may administer oaths and affirmations to all accounts, returns and other documents duly returned into the probate court. and may sign and record all orders, decrees, warrants for appraisement and partition, and all other processes issuing from said court,

SECT. 2. All acts and parts of acts inconsistent herewith are hereby repealed.

Returns of Clerks of Police, Municipal, and District Courts.

[The returns of several of the District and Police Court clerks include, under the head of disbursements in criminal cases, the expense for rent and care of court-room, stationery, etc. By General Statutes, chapter 116, section 21, such expenses are to be paid by the county treasurers, and appear in their returns. And, in making up the following table, they are not placed in the "criminal disbursement" column, but are given in the county treasurers' report.

COUNTIES.	Number of criminal cases in court, for year 1875.	Number of criminal cases in court, for six months, ending July 1, 1876.	No. of criminal cases of which court took final jurisdiction, for eighteen months, ending July 1, 1876.	No. bound over or committed to Superior Court, during eighteen months, ending July 1, 1876.	Number of criminal appeals to Superior Court, during eighteen months, ending July 1, 1876.	Number of civil cases entered in court in year 1875.	Number of civil cases entered during six months, ending July 1, 1876.	No. of civil cases in which trials were had, in eighteen months, ending July 1, 1876.	Number in which jury trials were claimed, in eighteen months, ending July 1, 1876.	No. of cases in which jury trials were actually had, in eighteen months, ending July 1, 1876.	No. of civil appeals taken to Superior Court, or exceptions to Supreme Judicial Court, in eighteen months, ending July 1, 1876.
BARNSTABLE COUNTY.											
No Police, Municipal or District Courts,	-	-	-	-	-	-	-	-	-	-	-
BERKSHIRE COUNTY.											
District Court of Northern Berkshire,	547	170	630	23	64	425	170	84	94	8	15
District Court of Central Berkshire,	475	251	637	44	45	360	187	153	[1]	[1]	63
District Court of Southern Berkshire,	121	51	133	31	4	227	130	45	56	13	28
Police Court of Lee,	218	88	292	14	19	187	91	36	-	-	17
Police Court of Williamstown,	191	64	115	4	15	26	18	18	-	-	2
BRISTOL COUNTY.											
First District Court of Bristol,	1,469[2]	-	1,371	62	36	382[2]	-	64	-	-	35
Second District Court of Bristol,	2,301	920	3,156	65	81	933	590	206	75	18	2
Third District Court of Bristol,	820	325	1,102	43	41	130	99	44	11	4	6
DUKES COUNTY.											
No Police, Municipal or District Courts,	-	-	-	-	-	-	-	-	-	-	-

Essex County.										
First District Court of Essex,	1,111	436	1,340	67	118	580	247	92	12	5	44
Police Court of Gloucester,	643	267	840	58	94	622	234	39	–	–	14
Police Court of Haverhill,	524	249	748	25	42	467[2]	–	48	–	–	88
Police Court of Lynn,	741	305	949	49	48	869	307	143	–	–	79
Police Court of Lawrence,	1,390	662	1,958	94	75	912	389	152	–	–	78
Police Court of Newburyport,	487	185	621	36	13	97	56	21	–	–	5
Franklin County.											
No Police, Municipal or District Courts,	–	–	–	–	–	–	–	–	–	–	–
Hampden County.											
District Court of Eastern Hampden,[3]	–	–	–	–	–	–	–	–	–	–	–
Police Court of Chicopee,	307	92	376	9	14	252	110	102	–	–	14
Police Court of Holyoke,[3]	–	–	–	–	–	–	–	–	–	–	–
Police Court of Springfield,	1,416	738	2,081	73	65	1,649	720	330	–	–	120
Hampshire County.											
No Police, Municipal or District Courts,	–	–	–	–	–	–	–	–	–	–	–
Middlesex County.											
District Court of Northern Middlesex,	112	30	109	5	3	119	41	39	19	6	16
District Court of Eastern Middlesex,	592[2]	–	503	34	45	679[2]	–	39	84	17	37
District Court of Central Middlesex,	79	38	110	7	6	48	32	16	–	–	12
District Court of Southern Middlesex,	569[4]	184[4]	702[4]	51[4]	56[4]	183[4]	143[4]	54	11	5	17
Police Court of Cambridge,	1,714	1,105	2,597	82	76	724	407	178	1	–	103
Police Court of Lowell,	1,433	671	1,922	68	114	660	254	185	–	–	61
Police Court of Somerville,	444	292	669	–	67	402	162	–	–	–	48

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[1] Juries not allowed.

[2] For eighteen months.

[3] No return from clerk of this court.

[4] For eighteen months, ending March 31, 1876.

Returns of Clerks of Police, Municipal, and District Courts—Continued.

COUNTIES.	Number of criminal cases in court, for year 1875.	Number of criminal cases in court, for six months, ending July 1, 1876.	No. of criminal cases of which court took final jurisdiction, for eighteen months, ending July 1, 1876.	No. bound over or committed to Superior Court, during eighteen months, ending July 1, 1876.	Number of criminal appeals to Superior Court, during eighteen months, ending July 1, 1876.	Number of civil cases entered in court in year 1875.	Number of civil cases entered during six months, ending July 1, 1876.	No. of civil cases in which trials were had, in eighteen months, ending July 1, 1876.	Number in which jury trials were claimed, in eighteen months, ending July 1, 1876.	No. of cases in which jury trials were actually had, in eighteen months, ending July 1, 1876.	No. of civil appeals taken to Superior Court, or exceptions to Supreme Judicial Court, in eighteen months, ending July 1, 1876.
NANTUCKET COUNTY.											
No Police, Municipal, or District Courts, .	-	-	-	-	-	-	-	-	-	-	-
NORFOLK COUNTY.											
District Court of East Norfolk, . . .	361	153	450	31	33	202	106	67	14	3	17
PLYMOUTH COUNTY.											
First District Court of Plymouth, . . .	247	134	369	12	8	157	82	30	23	8	-
Second District Court of Plymouth, . .	362[1]	-	348	14	16	143[1]	-	22	2	-	6
Third District Court of Plymouth, . . .	121	54	134	15	7	63	23	18	-	-	6
Fourth District Court of Plymouth, . .	163[1]	-	150	6	7	76[1]	-	8	3	1	3
SUFFOLK COUNTY.											
Municipal Court of the City of Boston, . .	13,257	5,561	12,339[3]	858[2]	661	5,924	3,142	853	-	-	878
Municipal Court of Brighton District, . .	386	172	529	29	46	169[1]	-	26	6	-	15
Municipal Court of Highland District, . .	2,251	922	2,774	92	238	674	245	99	18	8	42
Municipal Court of East Boston District, .	926	337	1,038	49	105	323	126	64	33	12	26
Municipal Court of Dorchester District, .	299	93	184	8	25	283	56	18	16	3	10
Municipal Court of West Roxbury District, .	405	155	516	46	50	90	30	39	5	1	6
Municipal Court of South Boston District, .	2,506	1,145	3,284	154	203	631	285	131	55	4	38

Municipal Court of Charlestown District, .	1,723[1]	-	1,673	50	127	666[1]	-	140	33	13	55
Police Court of Chelsea, ...	365	90	436	19	34	329	110	65	-	-	66
WORCESTER COUNTY.											
First District Court of Eastern Worcester, .	141	62	167	9	23	95	65	15	6	2	6
Second District Court of Eastern Worcester,	178	77	230	10	6	134	55	29	7	-	14
First District Court of Southern Worcester, .	346[1]	-	334	9	3	286[1]	-	21	7	-	4
Second District Court of Southern Worcester,	207	80	255	14	21	61	28	29	16	-	7
Third District Court of Southern Worcester,	611[3]	-	539[3]	7[3]	35[3]	65[3]	-	7[3]	5[3]	4[3]	-
Central District Court of Worcester, . .	2,441	957	3,107	93	198	1,601	725	438	722	50	150
Police Court of Fitchburg, ...	660	203	835	19	31	246	118	43	-	-	36

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[1] For eighteen months.

[2] For 1875 only.

[3] For year ending Sept. 30, 1876.

Returns of Clerks of Police, Municipal and District Courts—Continued.

COUNTIES.	Amount of fines and costs collected in criminal cases, in eighteen months, ending July 1, 1876.	Amount paid out in criminal cases for fees and other disbursements, in eighteen months, ending July 1, 1876.	Amount paid over to the county, in eighteen m'ths, ending July 1, 1876.	Amount of fees and costs collected in civil cases, in eighteen months, ending July 1, 1876.	Amount paid for disbursements and expenses, in eighteen months, ending July 1, 1876.	Amount paid over to county, in eighteen months, ending July 1, 1876.
BARNSTABLE COUNTY.						
No Police, Municipal or District Courts,	-	-	-	-	-	-
BERKSHIRE COUNTY.						
District Court of Northern Berkshire,	$2,883 06	$1,199 71	$1,101 72	$1,016 00[1]	-	-
District Court of Central Berkshire,	2,923 60	1,534 15	1,389 45	508 22	-	$508 22
District Court of Southern Berkshire,	707 76	454 32	253 44	485 99	-	485 99
Police Court of Lee,	1,379 90	661 99	667 49	172 95	-	172 95
Police Court of Williamstown,	700 03	215 79	513 87	32 63[2]	-	32 63
BRISTOL COUNTY.						
First District Court of Bristol,	$5,540 54	$8,423 75	$1,886 23	$396 50	-	$219 94
Second District Court of Bristol,	12,149 31	18,151 52	8,273 70	1,355 06	$759 89	2,192 06[2]
Third District Court of Bristol,	2,635 74	5,021 89	1,646 57	124 50[2]	-	124 50[2]
DUKES COUNTY.						
No Police, Municipal or District Courts,	-	-	-	-	-	-
ESSEX COUNTY.						
First District Court of Essex,	$10,601 93	$5,642 25	$4,042 59	$752 11	-	$743 02

Police Court of Gloucester,	$6,884 28	$3,895 91	$2,676 02	$826 14	-	$826 14
Police Court of Haverhill,	5,323 68	2,730 70	2,017 33	544 58	-	544 58
Police Court of Lynn,	9,024 31	5,135 09	3,347 95	863 00	-	863 00
Police Court of Lawrence,	4,253 85	947 75	3,406 10	1,013 51	$491 20	522 32
Police Court of Newburyport,	1,585 85	1,900 50	923 61	90 25	-	51 57
FRANKLIN COUNTY.						
No Police, Municipal or District Courts,	-	-	-	-	-	-
HAMPDEN COUNTY.						
District Court of Eastern Hampden,[4]	-	-	-	-	-	-
Police Court of Chicopee,	$1,859 41	$639 00	$881 10	$417 70	$128 50	$290 20
Police Court of Holyoke,[4]	-	-	-	-	-	-
Police Court of Springfield,	11,465 89	4,017 79	7,448 10	1,560 00[2]	-	1,560 00[2]
HAMPSHIRE COUNTY.						
No Police, Municipal or District Courts,	-	-	-	-	-	-
MIDDLESEX COUNTY.						
District Court of Northern Middlesex,	$972 81	$1,029 21	$663 75	$221 89	$695 72	$221 89
District Court of Eastern Middlesex,	3,894 81	1,329 06	1,426 15	449 88	-	309 61
District Court of Central Middlesex,	994 93	565 69	301 36	95 00	24 00	95 00
District Court of Southern Middlesex,	4,328 92[5]	5,620 13[5]	4,184 96	-	-	-
Police Court of Cambridge,	7,915 95	3,207 60	4,106 15	969 63	-	846 75
Police Court of Lowell,	7,175 62	1,867 42	5,651 55	414 54	-	414 54
Police Court of Somerville,	2,584 75	3,515 04	3,049 00[6]	430 65	-	[7]
NANTUCKET COUNTY.						
No Police, Municipal or District Courts,	-	-	-	-	-	-

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[1] Due, but uncollected.
[2] For 1875.
[3] Including "unclaimed fees."
[4] No return from clerk of this court.
[5] The criminal and civil costs, etc., are lumped together in one sum.
[6] Includes civil costs.
[7] See under criminal items.

Returns of Clerks of Police, Municipal, and District Courts—Concluded.

COUNTIES.	Amount of fines and costs collected in criminal cases, in eighteen months, ending July 1, 1876.	Amount paid out in criminal cases for fees and other disbursements, in eighteen months, ending July 1, 1876.	Amount paid over to the county, in eighteen m'ths, ending July 1, 1876.	Amount of fees and costs collected in civil cases, in eighteen months, ending July 1, 1876.	Amount paid for disbursements and expenses, in eighteen months, ending July 1, 1876.	Amount paid over to county, in eighteen months, ending July 1, 1876.
NORFOLK COUNTY.						
District Court of East Norfolk,	$3,212 30	$1,359 89	$1,331 26	$265 02	$77 32	$239 02
PLYMOUTH COUNTY.						
First District Court of Plymouth,	$1,534 86	$838 97	$1,390 45	$235 23	-	$235 23
Second District Court of Plymouth,	5,707 71	2,438 51	3,269 51	133 71	-	133 71
Third District Court of Plymouth,	1,441 83	1,081 45	1,170 66	97 55	-	97 55
Fourth District Court of Plymouth,	952 00	998 48	-	93 39	-	93 39
SUFFOLK COUNTY.						
Municipal Court of the City of Boston,	$24,294 50[1]	$58,903 35[1]	$16,494 50	$12,082 12	$3,750 00	$8,332 12
Municipal Court of Brighton District,	2,785 17	787 83	1,997 28	176 12	-	176 12
Municipal Court of Highland District,	7,284 60	5,040 98[1]	-	847 01	-	-
Municipal Court of East Boston District,	5,563 50	792 79	4,770 71	370 11	-	307 11
Municipal Court of Dorchester District,	1,672 58	576 96	1,095 62	310 03	-	310 03
Municipal Court of West Roxbury District,	2,701 56	897 34	2,419 29	115 58	-	-
Municipal Court of South Boston District,	10,723 45	1,019 65[2]	10,113 25	610 84	-	610 84
Municipal Court of Charlestown District,	4,855 29	1,049 55	3,805 74	564 92	-	564 92
Police Court of Chelsea,	3,118 37	1,267 93	1,845 44	448 65	-	448 65

WORCESTER COUNTY.						
First District Court of Eastern Worcester, . .	$1,877 06	$1,165 51	$664 01	$59 34[3]	-	-
Second District Court of Eastern Worcester, . .	2,553 00	1,134 27	1,012 95	194 64	-	$194 64
First District Court of Southern Worcester, . .	1,936 82	929 10	1,007 40	121 30	-	121 30
Second District Court of Southern Worcester, . .	1,963 66	1,565 48	1,096 50	125 55	-	125 55
Third District Court of Southern Worcester, . .	2,817 39	-	1,665 64	69 75	-	69 75
Central District Court of Worcester, ...	25,918 63	14,974 83	10,665 40	2,138 99	-	1,940 23
Police Court of Fitchburg, ...	3,042 27	4,217 83	1,672 87	392 42	$264 95	373 82

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[1] For 1875.

[2] Not including officer's fees.

[3] For last six months.

Returns of County Treasurers.

COUNTIES.	Costs of courts to county, from January 1, 1875, to July 1, 1876.	Amount paid to county by courts, from January 1, 1875, to July 1, 1876.	Costs paid to trial justices, by county, for year preceding establishment of courts.	Amounts paid to county by trial justices, during year preceding establishment of courts.
BARNSTABLE COUNTY.				
No Police, Municipal or District Courts,	-	-	-	-
BERKSHIRE COUNTY.				
District Court of Northern Berkshire,	$445 63	$1,101 62[1]	[2]	[2]
District Court of Central Berkshire,	402 99	1,897 87	[2]	[2]
District Court of Southern Berkshire,	1,261 81	583 17[3]	$220 90	$423 00
Police Court of Lee,	-	-	[2]	[2]
Police Court of Williamstown,	-	-	[2]	[2]
BRISTOL COUNTY.				
First District Court of Bristol,	$8,791 61	$2,468 01	$18,233 00[4]	$15,008 06
Second District Court of Bristol,	18,634 69	10,572 71	-	-
Third District Court of Bristol,	6,927 64	2,641 12	-	-
DUKES COUNTY.				
No Police, Municipal or District Courts,	-	-	-	-
ESSEX COUNTY.				
First District Court of Essex,	$10,285 69	$4,137 19	$223 00	$1,018 53

Police Court of Gloucester,	$3,969 50	$4,043 25	-	-
Police Court of Haverhill,	2,378 27	2,262 71	-	-
Police Court of Lynn,	5,047 98	3,833 29	-	-
Police Court of Lawrence,	8,187 62	3,755 28	-	-
Police Court of Newburyport,	2,153 59	910 38	-	-
FRANKLIN COUNTY.				
No Police, Municipal or District Courts,	-	-	-	-
HAMPDEN COUNTY.				
District Court of Eastern Hampden,	$2,601 31	$1,911 39	$881 83[5]	$452 00[5]
Police Court of Chicopee,	1,570 14	2,446 29	-	-
Police Court of Holyoke,	2,732 99	4,795 36	1,665 81	968 00
Police Court of Springfield,	7,808 93	10,570 43	-	-
HAMPSHIRE COUNTY.				
No Police, Municipal or District Courts,	-	-	-	-
MIDDLESEX COUNTY.				
District Court of Northern Middlesex,	$1,339 75	$885 64	$3,103 64	$1,048 50
District Court of Eastern Middlesex,	4,229 46	2,078 91	4,153 74	2,078 91
District Court of Central Middlesex,	1,239 56	323 56	64 16	18 00
District Court of Southern Middlesex,	5,526 25	3,217 57	6,305 69	4,061 30
Police Court of Cambridge,	8,147 35	5,164 58	-	-
Police Court of Lowell,	10,126 76	6,921 64	-	-
Police Court of Somerville,	3,925 88	2,484 85	-	-
NANTUCKET COUNTY.				
No Police, Municipal or District Courts,	-	-	-	-

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[1] No civil costs.

[2] No trial justices for many years.

[3] For 1875.

[4] For the whole county.

[5] For 1872.

Returns of County Treasurers—Concluded.

COUNTIES.	Cost of courts to county, from January 1, 1875, to July 1, 1876.	Amount paid to county by courts, from January 1, 1875, to July 1, 1876.	Costs paid to trial justices, by county, for year preceding establishment of courts.	Amounts paid to county by trial justices, during year preceding establishment of courts.
NORFOLK COUNTY.				
District Court of East Norfolk,	[1]	[1]	[1]	[1]
PLYMOUTH COUNTY.				
First District Court of Plymouth,	$4,770 69	$2,119 14	$6,879 03[2]	$2,564 00
Second District Court of Plymouth,	3,895 52	3,549 67	-	-
Third District Court of Plymouth,	2,174 98	1,213 36	-	-
Fourth District Court of Plymouth,	1,149 12	934 69	-	-
SUFFOLK COUNTY.				
Municipal Court of the City of Boston,	$54,967 60	$39,962 28	-	-
Municipal Court of Brighton District,	2,565 51	2,533 82	-	-
Municipal Court of Highland District,	6,153 29	7,223 98	-	-
Municipal Court of East Boston District,	3,950 38	5,184 07	-	-
Municipal Court of Dorchester District,	2,414 95	1,696 04	-	-
Municipal Court of West Roxbury District,	1,923 81	2,178 05	-	-
Municipal Court of South Boston District,	4,878 19	9,436 09	-	-
Municipal Court of Charlestown District,	4,679 71	4,269 81	-	-
Police Court of Chelsea,	2,413 96	2,175 44	-	-